This Special Issue of Business Systems Review includes selected and revised papers that have been presented at the 2nd Business systems Laboratory International Symposium "Systems Thinking for a Sustainable Economy. Advancements in Economic and Managerial Theory and Practice" that was held in Roma (Italy) on January 23-24 , 2014 at the Universitas Mercatorum.

The symposium aimed to address the global sustainability challenges by a systemic perspective.

Systems Thinking sheds the light to the several interactions between natural and social systems. Knowing these interactions gives a better understanding of the principles that can help solve some of today's most pressing environmental, social and economic issues.

The criticalities and the opportunities of sustainability have been faced according to the cutting edge research and practice in the various fields of social science.

This multidisciplinary perspective includes: economics, management, engineering and sociology.

In particular the symposium focused on the epistemological, theoretical, methodological, technical and practical contributions of the systemic approach to sustainable development to shape an agenda to address the present global economic and social challenges.

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Systems Thinking for a Sustainable Economy

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II B.S.Lab nternational Symposium - Roma 2014

SYSTEMS THINKING FOR A SUSTAINABLE ECONOMY

BUSINESS SYSTEMS REVIEW
ISSN 2280-3866
www.business-systems-review.org

Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

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TABLE OF CONTENTS

BUSINESS SYSTEMS REVIEW
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Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

ISSN: 2280-3866
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The Sustainability of Sustainability

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Submitted: March 1, 2014- Published: August, 6, 2014
DOI: 10.7350/BSR.D06.2014 – URL: http://dx.medra.org/10.7350/BSR.D06.2014

ABSTRACT

The concept of sustainability is confused and controversial, this resulting from ideological differences. It is a concept often connected to viability, which similarly becomes subject to difference of understanding. It becomes clear that the ideological differences are consistent with the rise of distinct paradigms. The paper considers two opposing paradigms that together and through degrees of congruency between them can be used to represent the whole set of paradigms. Using cybernetic agency theory, a set of generic mindsets is created. The paper then shows that each of the generic mindsets can be associated with various given paradigmatic values and goals of sustainability.

Keywords*:* sustainability, ideology, paradigms, agency theory, mindsets.

1. INTRODUCTION

Sustainability as a noun is fairly new to the English language, with its first dictionary recording in the late 1980s (Lutz Newton & Freyfogle, 2005). The Online Oxford dictionary definition of the word relates it to some actor that is: able to be maintained at a certain rate or level. The term is used across a number of disciplines and *"Given the large number of perspectives and contexts in which the term sustainability is used, its meaning varies widely across the literature"* (Stepanyan, Littlejohn & Margaryan, 2013: 94). The rise of the sustainability concept has drawn significant criticism (e.g., Harrison, 2000; Beckerman, 2002; Lutz Newton & Freyfogle, 2005; Swyngedouw, 2007) with some comments implying that it is an unsustainable concept due to its

unconvincing, controversial or unclear nature and development. So what is this confusion called sustainability?

Any study of sustainability needs to recognise that there may be more than one way of using the term that is dependent on cognitive orientation, and confusions may arise where orientations vary without an awareness that this is the case. Two such orientations are apparent from the literature: an organisational development reasoned self-interest that centres on introspective (or egocentric) self-sustainability, and an environmental reasoned interest that centres on extrospective (or ecocentric) ecology. Consistent with this, Söderbaum (1999) in his study of ecological economics distinguishes between two types of actor: the more ecocentric political economic actor and the more egocentric economic actor. The distinction between "political" and "economic" seems to carry some "disqualifying/qualifying" connotations, where "political" appears to refer to a perspective that is "irrational" and "economic" a "rational" perspective.

Söderbaum (1999) identifies the more ecocentric political economic actor as one that operates in a way that explicitly embraces socio-cultural, institutional, physical, man-made, and ecological attributes, and is likely to have a community directed orientation. That it takes a community perspective suggests that it is also likely be connected with the Collectivism perspective: this embraces allocentricism and therefore is positively accepting of in-group norms, subordinating its goals to those of the collective with which it is associated (Triandis, Bontempo & Villareal, 1988). For Mensah & Castro (2004) there is also a connection between ecocentric actors and the pessimistic view of sustainability where technology alone is not seen to be the able to resolve ecological problem situations.

Söderbaum (1999) also suggests that the economic actor operates in a way that is more consistent with perspectives that arise from neoclassical economics, relating to markets and prices. This also usually involves seeking optimisation of some utility (Simon, 1978). More broadly for Hardie & MacKenzie (2006) an economic actor should more correctly be seen as a socio-technical agency, involving not only human beings, but other attributes like technical devices and algorithms. Castelfranchi & Falcone (2000) argue that an economic actor is also fully a social actor in that it has such attributes as motives, ideas, relationships, and the trust (or lack of trust) that it has in its partners and in the institutions it is connected with. According to Mensah & Castro (2004), there is a connection between the economic actor and an optimistic ecological perspective which considers that the solution to ecological problem situations is basically technological. The economic actor may not only be a social actor, but also a political one. The distinction between a political economic actor and economic actor acting politically would seem to centre on to whom benefit is accrued to the political economic activity that is pursued, that is it is more ecocentric or egocentric. Both orientations of actor maintain an ideology, but it differs for each. This also connects with the rank order of goals being different. Ecocentricism is more social coherence directed and egocentricism is more individual wealth maximising directed. Both ideologies are performance oriented, but since the main goals are different, the view on performance or on what is constituted as "performance" is different. In an egocentric actor, ideology is more oriented towards egoistic self-development and self-sustainability, this having an intimate connection with not only performance, but also viability. This egocentric actor is also likely to be connected at some level to Individualism: where there is an idiocentric orientation in which actors prefer to "do their own thing" and to disregard the needs of communities, family, or work group; their behaviour also concerns goals that are consistent with various in-groups, to which they may have only temporary allegiances (Triandis, Bontempo & Villareal, 1988).

Stafford Beer has had an interest in self-sustainability in relation to the self-regulation of durable human activity systems. Self-sustainability is taken to refer to their capacity to survive and hence be viable. This constitutes an introspective/ ecocentric view of the system, where viability is taken as the capacity for self-sustainability (Beer, 2002). A system is viable if it: can survive even under considerable perturbation because it can take avoiding action; can acclimatise, can accommodate; and can adapt (Beer, 1989). So viability has attributes that include a capacity for sustainability and adaptability. This suggests that from viability comes sustainability.

In contrast, Bossel (1999) (cited in Spangenberg, 2005) takes an ecocentric view with an interest in organisational performance, and says that maintaining the viability of a system is equivalent to maintaining its sustainability, and viability is maintained if a system is able to react appropriately to changes in its system environment. This suggests that viability is dependent on sustainability.

This dependency distinction appears to suggest a lack of common agreement among theoreticians about the nature of, and relationship between viability and sustainability. Perhaps this is connected with their egocentric/ecocentric orientation. Lack of clarity about viability may also have its origin in its relationship with sustainability. According to Abeysuriya, Mitchell & Willetts (2006: 3) sustainability has "intellectual turmoil" associated with it, which perhaps is due initially to its "ideological controversy" (Gladwin, Kennelly, & Krause, 1995; Beckerman, 1994; Dowie, 1995; Levin, 1993).

This controversy and turmoil are indicated by the family of competing sustainability paradigms that seem to be prevalent in the literature, creating problems in coherently identifying satisfactorily what sustainability is and what one needs to do to maintain it. As a result, a number of distinct and often opposing paradigms have developed, culminating in the transition to a new paradigm through revolution and *"the usual developmental pattern of mature science"* (Kuhn, 1970: 12, cited in Abeysuriya, Mitchell & Willetts, 2006). Such a life cycle process of paradigms has been discussed by Guo, Yolles, Fink & Iles (2014).

Gladwin, Kennelly, & Krause (1995) argue that sustainability is a construct that is fundamentally infused with multiple objectives and ingredients, complex interdependencies, and considerable "moral thickness" leading to its fuzziness, elusiveness, contestability, and/or ideologically controversy. They identify a generalisation of the two diametrically opposing egocentric (or technocentric as they call this, rather assigning egoism to rationality and reasoning) and ecocetric paradigms of sustainability, to which they assign epistemic keyword values.

Gladwin, Kennelly, & Krause (1995) tell us that the paradigms that they have characterised through a set of epistemic values are not intended to indicate that all paradigm holders associated with one or the other opposing paradigms accept all of the values held by the given paradigm. However, might it be possible to assign views on sustainability generically? Establishing a generic representation involves creating characteristics that in some way relate to a class or group of things which must be identified and known, and this must necessarily engage a process of theorising through "disciplined imagination" (Weick, 1987: 516). In the case of sustainability, these classes or groups of things will be those that can be associated with specific characteristics of the Gladwin, Kennelly, & Krause paradigms. The disciplined imagination referred to is constituted by

> "*an ordered set of assertions about a generic behaviour or structure assumed to hold throughout a significantly broad range of specific instances…The dimensions implied by the definition are indicated by the terms ordered, generic, and range. As generalizations become more hierarchically ordered, behaviours and structures that are the focus of the*

> *generalizations become more generic, and as the range of specific instances that are explained becomes broader, the resulting ideas are more deserving of the label theory"* (Weick, 1987: 517).

Such disciplined imagination was applied to the concept of viability by Stafford Beer (1979) in the development of his Viable System Model (VSM), thereby explaining it through a broad theoretical framework. He also gave criteria that: *"addresses issues of diagnosing and designing the structures of an organization for viability and development"* (Schwaninger, 2001: 139).
So, this paper will also provide a broad theoretical structure that can offer a more formal explicit systemic perspective on the nature of sustainability. It takes a social viable systems approach that is generically able to describe the principles through which viable organisations can operate sustainably. More specific modelling approaches are possible (though not discussed here) given more detailed "organisational specificities" that can result in detailed explanations, for instance, of how policy options for future development can be delivered that embrace issues of sustainability. To develop the generic approach a cybernetic agency (Yolles, Fink & Dauber, 2011) will be defined that allows intelligent organisations to be examined and their behaviour anticipated, even under conditions of complexity. Unlike VSM, it is intended as an explanatory theory rather than a diagnostic one, though could be coupled with VSM to provide access to the diagnostics of viability (Yolles & Fink, 2011). The cybernetic agency has not only a capacity for intelligence and adaptation, but is responsive to both internal and external environments.
If one is able to identify generically which values are acceptable to some other general agency, then under the condition that the general other can be assigned more specific identity and value characteristics, then some anticipation can be made about not only attitudes towards sustainability, but also the possibility of behaviours that reflect those attitudes.
In a development of cybernetic agency theory, traits are assigned to the agency, some belonging to a "normative personality," permitting insights into plural agency mindsets and anticipation of future agency patterns of behaviour. From this, generic "Mindset" types are identified which are tied to and directed by an agency's cultural orientation. Using a technique called semantic mapping, these Mindset types are related to the ecocentric and egocentric paradigms as identified by Gladwin, Kennelly, & Krause (1995). The result will show that the set of epistemic values of each paradigm is distributed across the spectrum of Mindset types. Since different agencies are characterised by different types, they will not adopt all of the epistemic values of the ecocentric or egocentric paradigms. This necessarily will have impact on the coherence of any common view regarding sustainability and policy development.

2. UNDERSTANDING SUSTAINABILITY

In examining the meaning of sustainability it will be clear that its development has occurred with little coherence. The concept of sustainability came to popular notice after the 1987 Brundtland Report of the World Commission of Environment and Development, which defined sustainable development as: action that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Two years later, Robèrt Karl Henrik developed a consensus on requirements for a sustainable society which formulated a number of conditions to enable the maintenance of sustainability, this becoming a basis for conceptual developments in organizational sustainability (Ny et al., 2006).

Mensah & Castro (2004: 2) note that since it took on common use, the word sustainability has been vague and ambiguous in its definition and applicability. They argue that there are two main opposing schools of thought: the pessimists (called here the ecocentrics) and made up generally by groups of ecologists and related others (e.g., Non-Governmental Organisations, social anarchist politicians) who see that the earth cannot forever support the world's demand of renewable and non-renewable resources. In contrast the optimists (called here the egocentrics) and made up generally by groups of economists and related others (e.g., conservative & individualist politicians) who are equally convinced that market incentives, public policies, material substitution, recycling, and new technology can together satisfy the needs and improve the quality of human welfare for the future. The two schools may be thought of as representing competing paradigmatic approaches that are in direct contrast to each other, and illustrative of a lack of coherence in organisational theory (Gladwin, Kennelly, & Krause, 1995; Sterling, 2003).
The egocentric paradigm holding group also has its divisions through the support of faction paradigms referred to as strong sustainability and weak sustainability (Spangenberg, 2005). Weak sustainability is more egocentric than strong sustainability, and supports the view:

> *"that what counts is the overall value of the bequest package. Natural and artificial capital are, in principle, substitutes. Therefore, the depreciation and degradation of natural capital is permissible under the idea of intergenerational justice if artificial capital is produced at the same rate. Note that 'capital' is just shorthand for 'means of production'. The notion of natural capital is meant to emphasise the autopoietic nature of living nature."* (Ott, 2003: 62).

For Neumayer (1999) the weak sustainability paradigm (a sort of substitutability paradigm) requires that aggregate total net investment is maintained, and is equivalent to keeping the aggregate total value of man-made capital and natural capital at least constant. Natural capital and manmade capital can be seen as substitutes one for the other, both in relation to production and use. This allows for natural capital to be run down as long as enough human-made capital is built up in exchange. So, it is not important whether the current generation uses up non-renewable resources or dumps CO2 in the atmosphere, so long as enough machines, roads and ports are built up in compensation.
In contrast (Ott, 2003: 62)

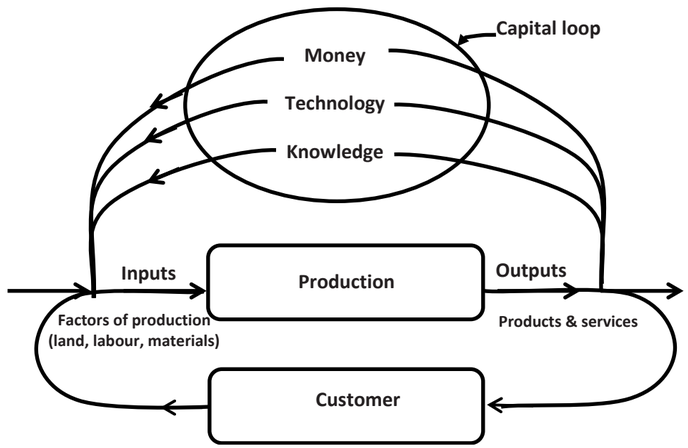
> *"strong sustainability [is more ecocentric and] emphasises that the human sphere is embedded in a natural system ('biosphere') and assumes that natural limits ought to constrain our actions. Artificial capital can only sometimes substitute for natural capital. In general, both kinds of capital are complementary. Those who claim that a natural entity is substitutable bear the burden of proof. Strong sustainability argues in support of a constant natural-capital rule. It notes that natural capital has already grown scarce and will probably become the limiting factor for economic production. Therefore, strong sustainability suggests that developed societies should invest in natural capital. Which indicators we use to measure sustainability depends on the basic conceptual choice."*

Neumayer (1999) takes it that strong sustainability (seemingly also referred to as the complementary paradigm) requires both the aggregate total value of man-made capital and natural capital and the total value of natural capital itself at least constant. Thus, both man-made and natural capital is complementary rather than being substitutable to each other. Strong sustainability also holds that rising consumption cannot compensate future generations for the

declining natural stock of directly utility relevant renewable resources. These two perspectives have been more finely classified by Turner (1992), who further distinguishes between strong and very strong, and weak and very weak paradigms.

Zeleny (1997) takes a distinctly different approach in his economic view of egocentric business processes. His interest lies in self-sustainability which he sees as "autopoietic," involving self-production or self-renewal as occurs in the "capital loop" defined by the continuous self-renewal of the portfolio of money, technology and knowledge, as shown in Figure 1. This "produces," over and over again, the enterprise itself. This view as presented seems to rest with other more classical economic egocentric perspectives in that it considers nothing about "human capital" or even softer issues like employee life situations or motivations that many consider are highly important to an organisation's performance. Neither does it connect with concepts such as corporate or environmental responsibility. While the overall approach is cybernetic involving self-production or self-renewal of commodities (capital, money, technology and knowledge), human beings are apparently irrelevant, as is the ecosystem. Interestingly, Zeleny's approach appears to wish to aspire, for enterprise self-sustainability, to the social theory of Luhmann (1986), even though its rather sparse citation list does not credit this.

Figure 1. Egocentric Perspective of an Enterprise showing Customer Production and Integration Processes within the context of self-sustainability.



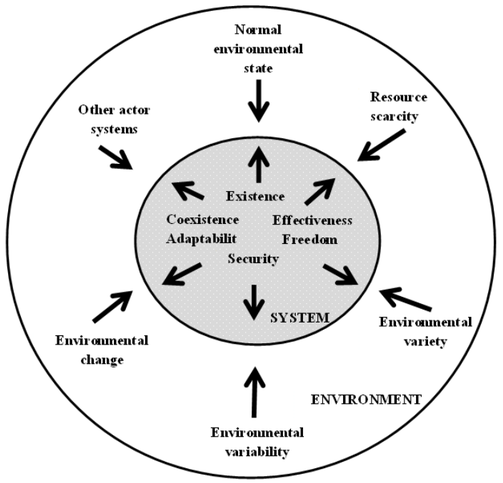
Bossel (2001) takes an ecocentric view of sustainability. In his approach holism is important, and centres on natural resource management under complexity. His interests lie in both sustainable development and viability. Sustainability is connected with performance, and viability is connected with the ability to survive and develop, where performance functions extend beyond "mere" viability requirements. The purpose of his study is to seek comprehensive indicator sets that assess viability and sustainability. His model of this complex system is presented in Figure 2.

Another more ecocentric perspective comes from Ny et al. (2006). Seeing sustainability as future oriented, they take a systemic perspective that explores aspects of corporate life-cycles. The view is that normal life cycle approaches not only lack a sustainability perspective, but also do not connect with the difficult trade-offs between specificity and depth and comprehension and applicability. In their work they introduce what they call a *"strategic life-cycle management"* approach that is able to include sustainability in relation to future operative conduct, and involves the creation of strategic analysis that is holistic (i.e. having a tendency towards the ecocentric paradigm) in respect of sustainability and strategy imperatives that arrive at sustainability.

Not all ecocentricists, however, are of one mind. One view, perhaps to be referred to as the want-to-be optimist's pessimism (since the paper is a negative critique of sustainability rather than a formulation of positive options), is that the concept of sustainability is squeezing out of play options for more pragmatic perspectives of conservation. Thus, Lutz Newton & Freyfogle (2005: 23) are concerned that sustainability is strategically unclear and undefined, and in particular is

> *"broadly conceived and considered in its many usages, sustainability has grave defects as a planning goal, particularly when used by conservationists: it confuses means and ends; it is vague about what is being sustained and who or what is doing the sustaining; ... it need not include a moral component; it is consistent with the view of humans as all-powerful manipulators of the planet; and, in general, it is such a malleable term that its popularity provides only a facade of consensus. When sustainability is defined broadly to include the full range of economic and social aspirations, it poses the particular risk that ecological and biodiversity concerns will be cast aside in favour of more pressing human wants."*

Figure 2. Ecological perspective of the indicators of viability and sustainability (Bossel, 2001).



Setting the discussion within the broader issue of conservation, they further note (Lutz Newton & Freyfogle, 2005: 30) that

"Given the fragmentation within the conservation community, we cannot be sanguine about prospects for a unified goal. A useful start, though, would be to cast aside sustainability and begin talking about its replacement. What is conservation for? What kind of society does it envision, and what will the benefits be if we head in that direction?"

Consistent with this more negative stance on the concept of sustainability, Beckerman (2002; 5; cited by Gordon, 2004) and referring to economic welfare (i.e., the level of prosperity and living standards of either an individual or a group of persons), says that the concept of sustainable development has nothing to add. It further reduces any objective to increase human welfare because the slogan of sustainable development seems to provide a blanket justification for almost any policy designed to promote human welfare, and this is irrespective of its cost and hence of the sacrifice of other ingredients of welfare.
As though anticipating the need for a contrasting response, Atkisson (1999: 200) considers that

"the definition of sustainability is neither vague nor abstract; it is very specific and is tied to measurable criteria describing how resources are used and distributed. Some of what currently gets called 'unsustainable development' is no such thing, but that does not mean the concept should be dismissed, any more than the concept of democracy should be dismissed when it is misappropriated by a dictatorship. Sustainability, like democracy, is an ideal toward which we strive, a journey more than a destination."

Perhaps seeking a balance between the egocentric and ecocentric perspectives within a business context, FTL (2013) is interested in corporate business sustainable development. This, we are told, must address important issues at the macro level such as: economic efficiency (innovation, prosperity, and productivity), social equity (poverty, community, health and wellness, human rights) and environmental accountability (climate change, land use, biodiversity). FTL further elaborates on the idea that sustainability is strategic, saying that it draws on dynamic resiliency, a term that refers to an organisational ability to survive shocks due to an intimate connection to healthy economic, social and environmental systems that create economic value, and contributes to healthy ecosystems and strong communities.
Gladwin, Kennelly, & Krause (1995) have gone further than FTL, explicitly seeking a synergy between the two opposing egocentric (introspective) and ecocentric (extrospective) perspectives (Table 1). Gladwin, Kennelly, & Krause (1995: 874) distinguish between the sustainability perspectives using other labels, but maintain the same orientation meanings. As such they refer to the egocentric paradigm as the Technocentric (through its faith in technology) and the Ecocentric paradigm (through its holistic ecological view). They also propose a congruent position that lies between them called the Sustaincentrism paradigm. Each of these paradigms is described through a set of epistemic values, which are collected under the three classifications of ontology/ethics, scientific/technological and economic/psychological beliefs/values. These paradigm characteristics represent a broad representation of values that may be associated with each worldview/paradigm, rather than a statement that all the values indicated for each paradigm are held by every paradigm holder. This is shown when they say:

> *"They [the paradigms] merely represent broad camps in which many schools of thought and subtle variations flourish. Given that worldviews in practice are typically taken for granted, it is reasonable to expect that no one person or institution would strictly hold to*

> *all of the assumptions within any one worldview. Human and organizational mindsets may very well mix assumptions from the different camps in a variety of complex, conflicting, and ill-defined ways. Our trichotomy is thus simply schematic, not photorealistic. However, we believe it is heuristically useful, because so much of the environmental and sustainability debate has been framed in terms of technocentrism versus ecocentrism (Shrivastava, 1995). Little theoretical progress can be made regarding the nature of sustainable enterprise on unquestioned grounds. The underlying assumptions about the world in which it is to exist must be surfaced and confronted"* (Gladwin, Kennelly, & Krause, 1995: 881).

Table 1. Polar opposite paradigms related to sustainability, and a congruent (or intermediate) paradigm (adapted from Gladwin, Kennelly, and Krause, 1995).

Key Assumptions	Technocentrism	Ecocentrism	Sustaincentrism
Ontological & Ethical			
Metaphor of earth	Vast machine	Mother/ web of life	Life support system
Perception of earth	Dead/passive	Alive/sensitive	Home/managed
System composition	Atomistic/parts	Organic/wholes	Parts and wholes
System structure	Hierarchical	Heterarchical	Holarchical
Humans and nature	Disassociation	Indisassociation	Interdependence
Human role	Domination	Plain member	Stewardship
Value of nature	Anthropocentrism	Intrinsicalism	Inherentism
Ethical grounding	Narrow homocentric	Whole earth	Broad homocentric
Time/space scales	Short/near	Indefinite	Multiscale
Logic/reason	Egoist-rational	Holism/spiritualism	Vision/network
Scientific & Technological			
Resilience of nature	Tough/robust	Highly vulnerable	Varied/fragile
Carrying capacity limits	No limits	Already exceed	Approaching
Population size	No problem	Freeze/reduce	Stabilize soon
Growth pattern	Exponential	Hyperbolic	Logistic
Severity of problems	Trivial	Catastrophic	Consequential
Urgency of problem interventions	Little/wait	Extraordinary/now	Great/decades
Risk orientation	Risk taking	Risk aversion	Precaution
Faith in technology	Optimism	Pessimism	Skepticism
Technological pathways	Big/centralized	Small/decentralized	Benign/decoupled
Human vs. natural capital	Full substitutes	Complements	Partial substitutes
Economic & Psychological			
Primary objective	Efficient allocation	Ecological integrity	Quality of life
The good life	Materialism	Antimaterialism	Postmaterialism
Human nature	Homo economicus	Homo animalist	Homo sapient
Economic structure	Free market	Steady state	Green economy
Role of growth	Good/necessary	Bad/eliminate	Mixed/modify
Poverty alleviation	Growth trickle	Redistribution	Equal opportunity
Natural capital	Exploit/convert	Enhance/expand	Conserve/maintain
Discount rate	High/normal	Zero/inappropriate	Low/complement
Trade orientation	Global	Bioregional	National
Political structure	Centralized	Decentralized	Devolved

In exploring sustainability, Gladwin, Kennelly, and Krause (1995) also recognise that it should be part of strategic management. This is consistent with Frechette (2010) who tells us that it drives long-term corporate growth, profitability, and corporate social responsibility. He also considers it to be future oriented, and often involves fundamental organisational change.

The ideological conflict and intellectual turbulence that occurs through a plurality of competing incommensurable paradigms leads to a lack of clarity not only in the definition of sustainability, but also in that of viability to which it is related. This is illustrated by Baumgärtner & Quaas (2007) who take an egocentric economic perspective through their interest in strong sustainability - where different natural and economic capital stocks have to be maintained as physical quantities separately. However, they then bring in the concept of uncertainty, and argue that to deal with this they require a concept of viability that fits their own conceptual criteria. Their distinct definition of viability is that different components and functions of a dynamic stochastic system remain in a domain where the future existence of these components and functions is guaranteed with sufficiently high probability. This notion of viability takes a strategic commodity view which in essence relates to the continued existence of certain natural capital stocks, and to the continued existence of certain services flowing from capital stocks.

Espinosa (2004) sees viability as referring to a social body that regulates itself and adapts to its environment – even in turbulent times. It is more concerned with long term survival, rather than sustainability this seen as being more concerned with the dynamics of growth. The viable system needs to be able to cope with the environmental pressures and changes, and to maintain internal stability. Long-term survival happens as a result of effective interactions at other levels of recursion of the society we belong to (i.e., the eco-region, the nation, the planet). Analysis of sustainability, then, can be used to recognise and to monitor main issues concerning its own viability. In this view, weak sustainability would appear to be subsidiary to broad viability.

Schwaninger (2001), through his exploration of the intelligent organisation, recognises that ideas about the nature of viability may vary. As such he distinguishes between two senses of the word: (a) the narrow sense of word viability is understood as the ability to maintain a separate existence, thereby having a distinct configuration which makes a system identifiable as such, and can be assessed on the grounds of structural considerations which are not bound by the orientations of the strategic and operational levels; (b) the broad sense of the word viability is connected with evolving structures, in which an organization's identity may completely change. Such broader notions of viability are reflective of Argyris & Schön's (1980) double loop learning (inherent as opposed to just strategic or single loop learning) and triple loop learning (pragmatic interpretation), as explained by Sterling (2003) in his thesis connecting sustainability to learning processes, especially with respect to broad viability.

Schwaninger (2001: 143) does not seem to be a supporter of narrow viability within the context of the intelligent organisation, since it: *"has often led to the self-maintenance or self-production of systems which show a dysfunctional behaviour vis-a-vis the larger wholes into which they are embedded."* The connection between viability and sustainability is also noted by him, his seeing sustainability as the capacity of an organisation to make positive net contributions to its own viability and the development of the larger super-system in which it is embedded (Schwaninger, 2001: 138).

A summary of the sample of views above on sustainability and its relationship with viability is given in Table 2, also distinguishing between positive and negative perspectives.

Table 2. Sample of Positive/Negative and Viability Views on Sustainability.

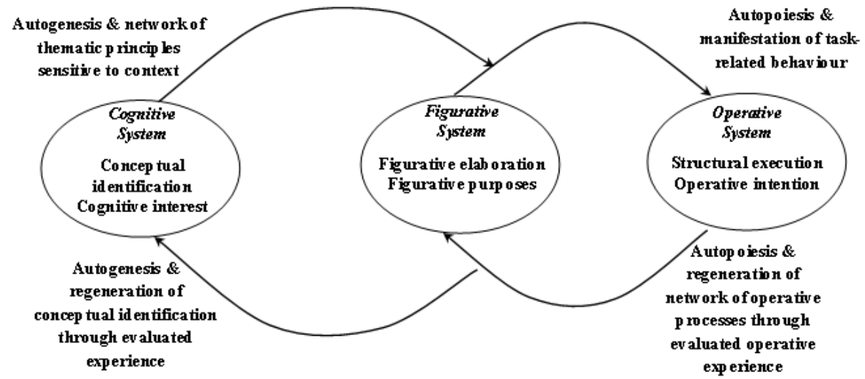
Author	Views on Sustainability
Positive view	
Atkisson (1999)	Sustainability is tied to measurable criteria describing how resources are used and distributed.
FTL (2013)	Sustainability addresses important issues at the macro level such as: economic efficiency (innovation, prosperity, and productivity), social equity (poverty, community, health and wellness, human rights) and environmental accountability (climate change, land use, biodiversity). Sustainability is strategic in corporate business. Implies dynamic resiliency: organisational ability to survive shocks due to healthy economic, social and environmental systems that create economic value, and contributes to healthy ecosystems and strong communities.
Frechette (2010)	Future oriented. Sustainability drives long-term corporate growth, profitability, and corporate social responsibility, and is an imperative for organisational change.
Negative view	
Beckerman (2002)	Sustainability is a null concept and works against human welfare, which refers to the level of prosperity and living standards of either an individual or a group of persons. It is a blanket justification for policy to promote human welfare irrespective of its cost and sacrifice of other ingredients of welfare.
Gladwin, Kennelly, & Krause (1995: 874)	Sustainability has multiple objectives and ingredients, complex interdependencies, and considerable "moral thickness" leading to fuzzy, elusive, contestable, and/or ideologically controversial nature. It is part of strategic management. Distinguishes the optimistic Technocentric (through its faith in technology), pessimistic Ecocentric (through its lack of faith in technology) and more balanced Sustaincentrism paradigm.
Lutz Newton & Freyfogle (2005)	Sustainability is strategically unclear and undefined, has grave defects as a planning goal, it confuses means and ends; it is vague about what is being sustained and who or what is doing the sustaining. sus-tainability should be cast aside. Humans seen as manipulators of the planet; and, in general, it is such a malleable term that its popularity provides only a facade of consensus. When sustainability is defined broadly to include the full range of economic and social aspirations, it poses the particular risk that ecological and biodiversity concerns will be cast aside in favour of more pressing human wants. It does not need a moral component.
Connection with Viability	
Baumgärtner & Quaas (2007)	From an economic perspective, different natural and economic capital stocks have to be maintained as physical quantities separately. Sustainability refers to a strategic commodity view relating to the continued existence of natural capital stocks, and the continued existence of certain services flowing from capital stocks. For viability, different components and functions of a dynamic stochastic system exist, & future existence of these is guaranteed with sufficiently high probability.
Bossel (2001)	Sustainability is connected with performance. Viability is connected with the ability to survive and develop, where performance functions extend beyond "mere" viability requirements.
Espinosa (2004)	Sustainability is concerned with the dynamics of growth. Long-term survival happens as a result of effective interactions at other levels of recursion of the society we belong to (i.e., the eco-region, the nation, the planet). Analysis of sustainability used to recognise & monitor viability. Viability must cope with the environmental pressures and changes, and to maintain internal stability. A viable system self-regulates itself and adapts to its environment – even in turbulent times. Concerned with long term survival.
Schwaninger (2001)	Sustainability is the capacity to make positive net contributions to viability and the development of the larger supersystem. Narrow viability is the ability to maintain a separate existence and this leads to self-maintenance or self-production of dysfunctional behaviour in relation to the whole system. Broad viability evolving structures, in which an organization's identity may completely change.

3. CYBERNETIC AGENCY THEORY

Social cognitive theory provides a conceptual framework that explains how actors, taken as agencies, make choices and motivate and regulate their behaviour on the basis of belief systems which is the foundation of agency (Bandura, 1997). An agency may be a singular entity (e.g. an individual) or a plural or collective entity (group decisions that still require each individual's effort and choice; Bandura, 2001).

The plural agency is a collective of actors that act together under a common culture within which norms that guide its modes of being and behaviour. The concept of the plural agency is related to the idea of the first person plural (Sellars, 1963). A plural agency operates through its collective norms, and its strategic component is referred to as its normative personality. These norms are due to its culture which influences its normative personality and that is responsible for attitudes, strategies, and the decision making imperatives. The nature of the normative personality can be represented through a set of 3 traits that determines the agency's mode of collective thinking and its behavioural orientation. It is an intelligent, proactive self-regulating and self-organizing body that is participative in creating its own behaviour and contributors to its own life's circumstances (Yolles, Fink & Dauber, 2011). These properties, however, may be susceptible to pathologies that damage its social health.

Figure 3. Generic Model of a "Living" Social Viable System.



In Figure 3 we offer a generic social viable system model of a super-system which can be identified as "living" if the interconnections satisfy the properties of autopoiesis[1] (Maturana & Verala, 1973 & 1980) and autogenesis[2] (Schwarz, 1997). It is a broadly viable system that develops strategies as part of its social "living" processes that enables it to develop policies, the consequence of which include responses to ideas of sustainability where they are of significance to the agency. The cognitive system offers an important directive for the living super-system since it is here that identity constructs occur that act as a referent field of influence for the rest of the super-system. Seeing these systems in terms of fields of influence, the cognitive system operates as a field attractor for the super-system as a whole. Autopoiesis is constituted simply as a network of processes that enables cognitive system activity to become manifested operatively (Schwarz, 1997), and this is conditioned by autogenesis – a network of principles (that may be seen as second or higher order processes) that create a second order form of autopoiesis guiding autopoiesis. The conceptual system maintains conceptual entities that act as a formative reference for the figurative system in which conceptual entities are manifested through autogenesis as structured schematic entities, which create a strategic potential for the super-system. The

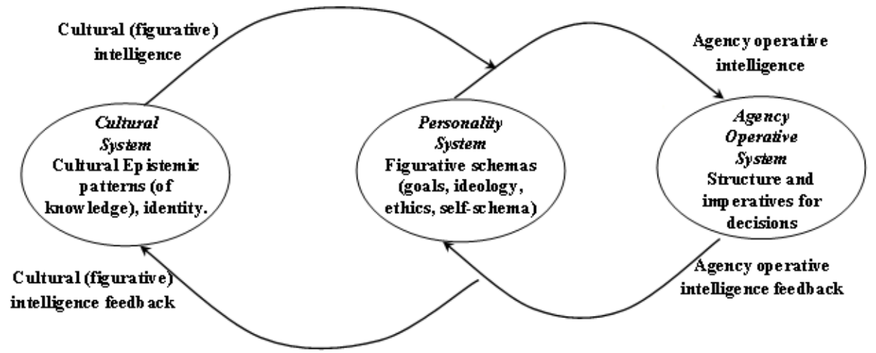
operative system operates through structured operative entities, manifested by autopoiesis from the figurative system, and from which together with stimuli from its operative environment it undertakes its operative functions. Feedback between each of the systems enables the super-system as a whole to learn.

Autogenesis is a network of principles (second order processes) that facilitates an ability to create, organise, and prioritise according to some cognitive interest associated with self-identification that permeates the cognitive system for a given operative context. Autopoiesis occurs as a network of processes that are used to connect elaborated figurative schemas to a set of possible operative actions that conform to these schemas under the given context. Responses may be fed back to the figurative and cognitive system so as to amplify or supress particular figurative schemas or conceptual identifications. Considering autogenesis as a conduit through which a network of transformative processes are active, then it is a generator of the strategic (or figurative schema) laws through which the agency operates. Similarly, an autopoietic conduit is a generator for operative laws and relationships (Schwarz, 1997).

While Figure 3 is a representation of the core concept of a living system, it may be used to provide a model of a cybernetic agency, as shown in Figure 4. Here, the terms autopoiesis and autogenesis have been replaced by Piagetian intelligences. For Piaget (cited in Elkind, 1976: 56), intelligence is something that creates an internal connective orientation within an agency (or its personality) towards its environment. This orientation is connected to the capacity of the agency to adapt (Piaget, 1963: 3-4, cited in Plucker, 2012). The Piagetian (1977) intelligences include operative intelligence which frames how the world is understood and where understanding is unsuccessful operative intelligence changes.

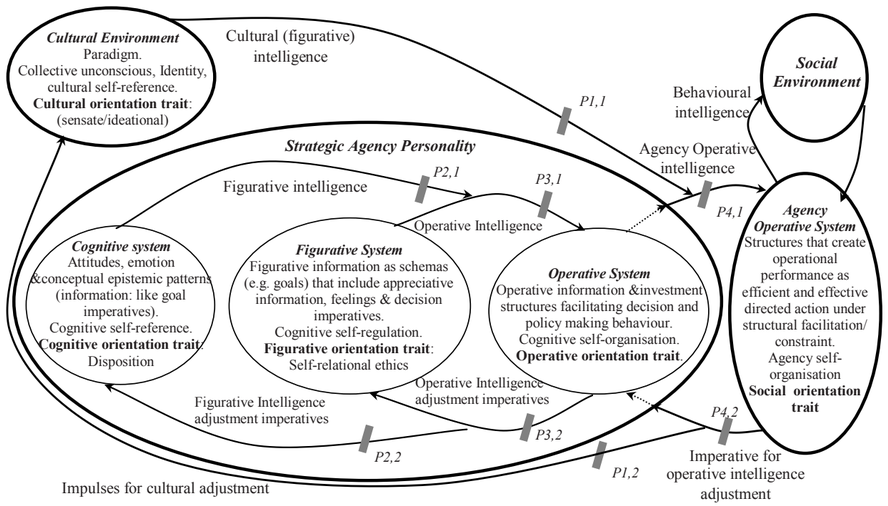
Following Yolles, Fink & Dauber (2011), autopoiesis is a concept that is quite similar in nature to that originally introduced by Piaget (1963 & 1977) in the study of children learning and behaviour - called operative intelligence, and autogenesis is directly related to figurative intelligence.

Figure 4. Generic Model for a Living System Agency.



Operative intelligence is concerned with the representation and manipulation of the transformational aspects of reality, and involves all actions that are undertaken so as to anticipate, follow or recover the operative transformations. It also refers to highly integrated and generalised sets of actions that are adaptive in nature (Schoenfeld, 1986). It can thus be thought of as the effective capacity to create a cycle of activity that manifests schemas operatively.
Figurative intelligence is a form of autogenesis (Schwarz, 1997; Yolles, Fink & Dauber, 2011) that provides core relational explanations of reality as a reflection of epistemic patterns of knowledge or cognitive information. Connected with states of reality, it manifests epistemic patterns in the figurative system to enable strategic schema. These schema may be constituted as perception, drawing, mental imagery, language and imitation (Montangero & Maurice-Naville, 1997; Piaget, 1950; Piaget & Inhelder, 1969).
Further development of Figure 4 is possible, noting that the nature of the core generic model in Figure 3 is that it is recursive (Yolles, 2006), and this permits one to seek a "living system" within the living system. Deeper recursions are also possible with the caveat that they make sense and are meaningful within the context that is defined for them. A full representation of an agency, involving culture, a normative personality, and an operative system in contact with an environment, is shown in Figure 5.

Figure 5. A Relational "Living System" meta-model of an Agency in Interaction with its Environments.



Note: *Pi,j* (where pathology type *i=1,4* and order *j=1,2*) refers to type-pathologies that can arise through both *intelligence limitation* and impeded *efficacy*

There are two forms of operative intelligence illustrated in this figure: one is connected with the agency as a whole, and the other with its normative personality, and both have similar functions. Personality operative intelligence manifests strategic schemas from the figurative system to the

operative system. Agency operative intelligence manifests agency schemas from the personality as a whole to the agency operative system. While both personality and agency operative intelligences are constituted as a network of self-producing processes, in the agency they involve bureaucracy - this being responsible for the implementation of policy that arises from the normative personality.
Here, the normative personality is a strategic super-system within the agency that has within it a cognitive, figurative and operative system. The cognitive system is where cultural knowledge has been delivered as patterns of conceptual information that is directly relevant to contextual situations. It is here where context sensitive patterns of information reside that can inform both strategic and operative needs. Where concepts of sustainability are important to the agency and there is knowledge about how this may occur, then patterns of sustainability information will be identifiable here. It is here that values about sustainability must be manifested from culture, or they simply reside in the background without strategic action.
The figurative system is where personality schemas reside as patterns of strategic information which include goals, ideology, ethics, and self-schema (this latter reflecting how an agency is expected to think, feel and behave in a particular situation in a way that is related to the perception of self: Crisp & Turner, 2010). It is here that, through purpose, schemas are formulated that need to embed the principles of sustainability that are derived from the cognitive system, and which can be expressed through ideology and ethics, and specified through goals. Ideology and ethics interact here with other strategic schemas.
Sustainability will always have an ideological component, which is either introspective and connected with egocentrism or extrospective and connected with ecocetrism. Ideology (as well as ethics) will also interact with and therefore inform strategic goals (Yolles, 1999). The goals that result are expressed through operative intelligence as policy options that can be decided upon in the personality operative system. Sustainability, in this modelling process, is related to the implementation of agreed policies within the social environment. If policy implementations are successful according to whatever criteria are being used, and if the policy involves issues of sustainability, then behavioural sustainability has likely resulted. Otherwise the policies may be classed as resulting in behaviours that are unsustainable. This is true within both ecocentric and egocentric orientations. Unsustainable policies are likely to have some impact on agency viability. A useful illustrative case study of this connection between policy and sustainability is provided in a study by Daw & Grey (2005) on European Union policy in fisheries and unsustainable practices.
The operative system maintains patterns of structured information which enable decision to be formulated and executed. Here, decisions are made to enable strategic schemas to be manifested operatively, and according to strategic interests. These interests are related to sustainability, so decisions about a raft of specifications are made to enable operative sustainable operational processes to develop.
The intelligences couple these systems together. Both operative and figurative intelligence are networks of (first and second order) processes that are the result of collective actions that have occurred between components of the plural agency (e.g. cooperation among departments or project activities including communications). These intelligences are susceptible to pathologies, and may be due to poor communications, poor distribution of current knowledge, poor attitudes, or cultural incoherence due to a lack of normative definition.

The intelligences may be seen as a network of relational processes of transformation of a definable set of components of a given domain of the living system that: (i) through their interactions and transformations, continuously regenerate, realize and adapt the relations that produce them; and (ii) constitute its socio-cognitive nature as a concrete unity.

Here it may be seen that there are two forms of figurative intelligence in the agency: cultural (figurative) intelligence and personality figurative intelligence. Cultural (figurative) intelligence is used when knowledge is manifested from agency culture to the cognitive system in the personality as conceptual information. Through figurative intelligence within the personality, this information is then again manifested as a variety of strategic forms of schema like goals, ideology, ethics, and self-scripts the latter of which connect strategic expectations with operative structure and behaviour.

An agency is interactive with an environment that may include other agencies, and this is also illustrated in Figure 5. It functions through behavioural intelligence, as represented through its overt actions (Ang et al., 2007: 6). Behavioural intelligence is connected with how policy that has been developed in the personality is implemented. It occurs as a "structural coupling" (Maturana & Varela, 1987), meaning that there is an epistemic relationship between two "living system" coupled entities, which create an interactive connection between their past, present and future histories.

Operative intelligence may deliver information in a way that is efficacious, impacting on operative performance. In the plural agency, this is normally referred to as collective efficacy. Lindsley, Brass & Thomas (1995) citing Guzzo, Yost, Campbell, & Shea (1993: 9) note that efficacy is a task specific potency that is meant to refer to a shared belief about general effectiveness across multiple tasks encountered by groups in complex environments. Efficacy is normally taken as the capability an agency has to organize and implement a series of actions to produce given attainments or performances (Bandura, 1977, 1986; Wood & Bandura, 1989). This capability is influenced by the capacity of operative intelligence to generate coherence, and (as noted by Bandura, 2005: 316) an agency's interactive, coordinative, and synergistic dynamics. Efficacy, through feedback to the figurative system, has also been seen to affect goal setting, choice of activity, amount of effort that will be expended, analytic strategies, and persistence of coping behaviour (Bandura, 1977; Wood & Bandura, 1989; cited in Lindsley, Brass & Thomas (1995: 647).

Efficacy also influences figurative intelligence. It is concerned with the relationship between cognitive conceptualisation that are connected with cultural knowledge, and figurative schemas that include self-schemas, goals, ideology, and ethics. Efficacy is reduced with the development of pathologies $P_{i,j}$ in Figure 5, where (i,j) are such that they indicate type i=1,4 and order j=1,2. These pathologies can result in agency dysfunction.

4. AGENCY TRAITS AND MINDSETS

When referring to *normative personality* reference is being made to the norms in a collective that may together coalesce into a unitary cognitive structure such that a collective mind can be inferred, and from which an *emergent* normative personality arises. To explain this further, consider that a potentially durable collective develops a dominant culture within which shared beliefs arise in relation to its capacity to produce desired operative outcomes. Cultural anchors arise which enable the development of formal and informal norms to which patterns of

behaviour, modes of conduct and expression, forms of thought, attitudes, and values are more or less adhered to by those that compose the plural agency. When the norms refer to formal behaviours, then where the members of the collective contravene them, they are deemed to be engaging in illegitimate behaviour which, if discovered, may result in formal retribution - the severity of which is determined from the agency's ideological and ethical positioning. This occurs with the rise of collective cognitive processes that start with information inputs and through communication and decision processes result in orientation towards action; and it does this with a sense of the collective mind and self. It is a short step to recognise that the collective mind has associated with it a normative personality. Where a normative personality is deemed to exist, it does not necessarily mean that individual members of the collective will all conform to all aspects of the normative processes: they may only do so "more or less." According to Yolles (2009), as long as a plural agency has a durable culture to which participants more or less conform through its norms, a "collective mind" is implied that operates through meaningful dialogue and agreement. As such the plural agency may appear to behave more or less like a singular cognitive agency. While the plural agency is ultimately composed of singular agencies, they are similar, can suffer from related pathologies that include: dysfunctions, neuroses, feelings of guilt, adopt and maintain collective psychological defences that reduce pain through denial and cover-up, and operate through processes of power that might be unproductive (Kets de Vries, 1991).

In the same way that singular agencies learn, so do plural agencies. The capacity of the normative personality for learning is represented through cognitive learning theory (e.g., Miller & Dollard, 1941; Miller et al., 1960; Piaget, 1950; Vygotsky, 1978; Argyris & Schön, 1978; Nobre, 2003; Argote & Todorova, 2007), where *"learning is seen in terms of the acquisition or reorganization of the cognitive structures through which agencies process and store information"* (Good & Brophy, 1990: 187). Set within cognitive information process theory, the collective mind is seen as an information system that operates through a set of logical mental rules, and strategies (e.g., Atkinson & Shiffrin, 1968; Bowlby, 1980; Novak, 1993; Wang, 2007).

The agency model has epistemic value properties that determine its characteristics, and hence enable anticipation for the patterns of behaviour that are likely to develop. These characteristics determine its value system, its attitudes, its modus operandi, and its potential for behaviour under given contexts. The traits that the agency has (Tables 3 and 4) take epistemic values, all of which arise from well researched, if disbursed, empirical studies (see Yolles, Fink & Dauber, 2011; Yolles & Fink, 2014).

Mindset Types have been set up against the polar enantiomers and their epistemic values as shown in Table 4. Though trait values may also occur as balances between the polar values, resulting in what we call congruencies between Mindset types. *It should be noted that the type numbers do not imply trait importance, but simply offer a counting aid.*

The nature of the normative personality can change. In the plural agency it is determined by its membership that defines its self-schema. The characterisation of a normative personality can be determined by three traits, one for each of the personality systems, and each takes one of two polar opposite values (called enantiomers), or a balance between them. Enantiomer key values are also indicated. These traits combine together to form Mindset types that define the nature of a personality. The nature of these types is that they fall into one of two broad classifications: Individualism and Collectivism (Yolles & Fink, 2013) as shown in Table 5.

Table 3. Bi-Polar Traits Normative Personality Traits.

Traits	Dimensions/Poles	Values/Items	Key Words
Cognitive	Intellectual Autonomy	Meaning is found in the uniqueness of the individual that is encouraged to express internal attributes (preferences, traits, feelings, motives). Intellectual autonomy takes it that individuals are encouraged to pursue their own ideas and intellectual directions independently (important values: curiosity, broadmindedness, creativity	Autonomy, freedom, creativity, expressivity, curiosity, broadmindedness.
	Embeddedness	Meaning in life can be found largely through social relationships, identifying with the group, participating in a shared way of life, and the adoption of shared goals. There tends to be a conservative attitude in that support is provided for the status quo and restraining actions against inclinations towards the possible disruption of in-group solidarity or the traditional order.	Polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours.
Figurative	Mastery & Affective Autonomy	Promotes the view that active self-assertion is needed in order to master, direct, and change the natural and social environment to attain group or personal goals. Tends to be dynamic, competitive, and oriented to achievement and success, and are likely to develop and use technology to manipulate and change the environment to achieve goals. Affective autonomy pursues positive affective experience.	Ambition, success, daring, competence, exciting life, enjoying live, varied life, pleasure, and self-indulgence. Exciting life, enjoying live, varied life, pleasure, and self-indulgence.
	Harmony	The world should be accepted as it is, with attempts to understand and appreciate rather than to change, direct, or exploit. Emphasis on fitting harmoniously into the environment. There is an expectation that there will be a fit into the surrounding social and natural world. Leaders that adopt this type try to understand the social and environmental implications of organizational actions, and seek non-exploitative ways to work toward their goals.	Unity with nature, protecting the environment, world at peace
Operative	Hierarchy	Supports the ascription of roles for individuals to ensure responsible, productive behaviour. Unequal distribution of power, roles, and resources are seen to be legitimate (values: social power, authority, humility, wealth). The hierarchical distribution of roles is taken for granted and to comply with the obligations and rules attached to their roles.	Social power, authority, humility, wealth
	Egalitarianism	There is a recognition of others being moral equals who share basic interests. There is an internalisation of a commitment towards cooperation, and to feelings of concern for everyone's welfare. There is an expectation that people will act for the benefit of others as a matter of choice (values: equality, social justice, responsibility, honesty).	Loyal, equality, responsible, honest, social justice, helpful

Table 4. Mindset Types identified with their enantiomer values, and a listing of key epistemic terms that relate to them.

Mindset Type	Enantiomer	Epistemic Value
1: *HI* Hierarchical Individualism	Intellectual Autonomy	broad-mindedness, freedom, creativity, curious
	Mastery & Affective Autonomy	successful, ambitious, independent, influential, social recognition, choosing own goals, daring
		exciting life, varied life, pleasure, enjoying life, self-indulgent
	Hierarchy	authority, wealth, social power
2: *EI* Egalitarian Individualism *Maruyama: I (Independent Prince)*	Intellectual Autonomy	broad-mindedness, freedom, creativity, curious
	Mastery & Affective Autonomy	successful, ambitious, independent, influential, social recognition, choosing own goals, daring
		exciting life, varied life, pleasure, enjoying life, self-indulgent
	Egalitarianism	loyal, equality, responsible, honest, social justice, helpful
3: *HS* Hierarchical Synergism	Intellectual Autonomy	broad-mindedness, freedom, creativity, curious
	Harmony	accept my position in life, world at peace, protect environment, unity with nature, world of beauty
	Hierarchy	authority, wealth, social power
4: *ES* Egalitarian Synergism *Maruyama: G (Generative Revolutionary)*	Intellectual Autonomy	broad-mindedness, freedom, creativity, curious
	Harmony	accept my position in life, world at peace, protect environment, unity with nature, world of beauty
	Egalitarianism	loyal, equality, responsible, honest, social justice, helpful
5: *HP* Hierarchical Populism *Maruyama: H (Hierarchical Bureaucrat)*	Embeddedness	polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours
	Mastery & Affective Autonomy	successful, ambitious, independent, influential, social recognition, choosing own goals, daring
		exciting life, varied life, pleasure, enjoying life, self-indulgent
	Hierarchy	authority, wealth, social power
6: *EP* Egalitarian Populism	Embeddedness	polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours.
	Mastery & Affective Autonomy	successful, ambitious, independent, influential, social recognition, choosing own goals, daring
		exciting life, varied life, pleasure, enjoying life, self-indulgent
	Egalitarianism	loyal, equality, responsible, honest, social justice, helpful
7: *HC* Hierarchical Collectivism	Embeddedness	polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours.
	Harmony	accept my position in life, world at peace, protect environment, unity with nature, world of beauty
	Hierarchy	authority, wealth, social power
8: *EC* Egalitarian Collectivism *Maruyama: S (Social Reformer)*	Embeddedness	polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours.
	Harmony	accept my position in life, world at peace, protect environment, unity with nature, world of beauty
	Egalitarianism	loyal, equality, responsible, honest, social justice, helpful, cooperation

In Table 5 the Mindset types have been formulated according to whether they broadly conform to Individualism or Collectivism (Yolles & Fink, 2013). This arises because of the enantiomer driver of Individualism (Mastery) and that of Collectivism (Harmony). To put this into context it is appropriate to understand a little more the nature of Individualism and Collectivism. Following Oyserman, Coon & Kemmelmeier (2002), individualism is the doctrine that all social

phenomena (their structure and potential to change) are *in principle* explicable only in terms of individuals – for instance their properties, goals, and beliefs. In contrast, Collectivism *in principle and ideally* relates to people coming together in a collective to act unitarily through normative processes in order to satisfy some commonly agreed and understood purpose or interest. Agencies that strongly adopt either Individualism or Collectivism have realities that are differently framed, and hence maintain ontologically distinct boundaries constituting frames of reality, which could represent barriers for coherent meaningful mutual communications across these agencies. Individualism and Collectivism are very broad concepts and can mean quite different things to different cultures, and this variation in their natures is reflected in the set of Mindset types that can arise, and their congruent interconnections. Nevertheless Gelfand et al. (1995) believed that an undifferentiated view of Individualism and Collectivism presented a satisfactory way of seeing them. However, Schwartz (1994) had found this unsatisfactory, and had replaced the broad notions of individualism and collectivism by his differentiated value universe devoid of reference to Individualism and Collectivism. It is also worth noting that Schwartz did not perceive Individualism and Collectivism as mutually exclusive opposites, but referred to values, e.g. wisdom, that are related to both, which have a mutually supportive role to play.

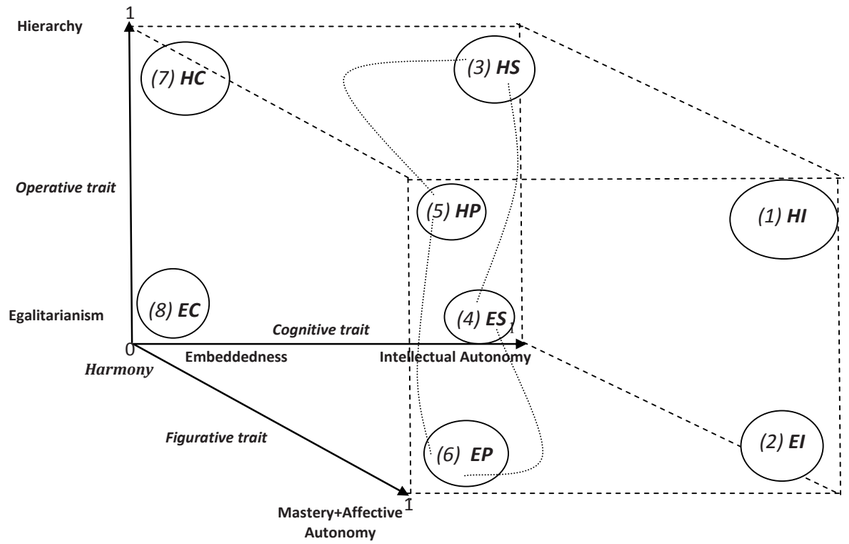
Table 5. Four Pairs of Contrasting Mindset Types.

Pole 1 - Individualism Type		**Pole 2 - Collectivism Type**	
Mastery Individualism	**Enantiomers**	***Harmony Collectivism***	**Enantiomers**
1: *HI* **Hierarchical Individualism**	Intellectual Autonomy Mastery & Affective Autonomy Hierarchy	**8: *EC*** **Egalitarian Collectivism**	Embeddedness Harmony Egalitarianism
2: *EI* **Egalitarian Individualism**	Intellectual Autonomy Mastery & Affective Autonomy Egalitarianism	**7: *HC*** **Hierarchical Collectivism**	Embeddedness Harmony Hierarchy
Harmony Individualism => Synergism		***Mastery Collectivism => Populism***	
3: *HS* **Hierarchic Synergism**	Intellectual Autonomy Harmony Hierarchy	**6: *EP*** **Egalitarian Populism**	Embeddedness Mastery & Affective Autonomy Egalitarianism
4: *ES* **Egalitarian Synergism**	Intellectual Autonomy Harmony Egalitarianism	**5: *HP*** **Hierarchical Populism**	Embeddedness Mastery & Affective Autonomy Hierarchy

Different authors give different weight to specific aspects and illustrate their perceptions of Individualism and Collectivism with "two-word" constructs, like for instance in economics 'methodological individualism' versus 'methodological institutionalism' (Davis, Marciano & Runde, 2004), or more common to politics 'transactional individualism' versus 'relational collectivism' (Herrmann-Pillath, 2009; Tangen, 2009; Glasman et al, 2011). However, we also find the use of the same term to describe different constructs, like 'Conservative Individualism' as opposed to 'Socialist (or Collective) Individualism' or 'Transactional Individualism' as opposed to 'Relational Collectivism'. The respective pairs strongly depend on the ideological

position of those who adopt the terms as ideology is seated in the personality. Here, different weight may be given to the intellectual, spiritual, economic or social aspects of "individualism", or on the intellectual, spiritual, economic or social aspects of "equality", or on the 'right to enjoy' individual achievements without boundaries or 'responsibilities' to take care of other human beings and of natural resources.
Even so Mindsets have powerful explanatory value for Individualism/ Collectivism when taken to operate as broad categories. Individualism frames the development goals of *autonomy and independence* while Collectivism frames *relatedness and interdependence* (Tamis-LeMonda et al., 2008; Schartz, Luychx & Vignie, 2011). Individualism and Collectivism both embrace distinct cultural identities (from which organisational structures are a reflection) that are manifested within individuals as self-identity that impacts on basic motives for action (Earley & Gibson, 1998).

Figure 6. Mindset Personality Space showing Eight Mindset Types, where congruencies may occur between them that derive from trait enantiomer balances.



Viskovatoff (1999) also notes that Individualism-Collectivism represents a dualism, and recognises attempts to overcome its effects by (a) adopting a post-structuralist approach; (b) recognising that reality should be seen as chaotic (and hence subject to chaos), disorganized and fragmented (hence affecting the framing of development goals); and (c) viewing the social world in terms of the *decentred* subject (thus impacting on self-identity).
Collectivism and Individualism each have their own value ranges, but the boundaries between their differentiations can become merged. Thus, the notions of Toennies (1957), Triandis (1995) and White & Nakurama (2004) connect through *transactional* and *relational* forms of

Collectivism (Yolles, 2009), so that for instance *Transactional Collectivism* is constituted as a boundary for Individualism.

It is quite easy to identify the respective number of possible Mindset types, if one well defines the possible states (2 or more) of a bi-polar trait and based on a consistent theory defines the number of traits. In addition to the extreme polar types in Table 5 (illustrated graphically in Figure 6) there are types that can arise from balanced traits. For 3 traits with 3 possible states (pole 1, balanced, pole 2) there are 27 possibilities in the system. This illustrates the capacity of Mindset agency theory to engage with variation, which enables the modelling of the complexities of human personality beyond a simple classification scheme. These include 8 *biased* Mindsets that are combination of the poles of the three traits – one in each of the 8 corners of the cube (the apexes), 1 *congruent* Mindset composed of 3 balanced traits in the middle of the cube (Figure 5). There are 6 *strongly congruent* Mindsets with 2 traits in balance in the middle of the 6 sides of the cube. Finally, there are also 12 *weakly congruent* Mindsets with only 1 trait in balance in the middle of the 12 lateral edges of the cube (Figure 6).

However, the range of values (scores) that a personality trait may take between the two extreme polar enantiomers may be represented by a continuous variable This would result in the huge discrete set of possible Mindset types becoming a potentially continuous and hence infinite set that can represent any possible values or value balance of a personality. In practice, however, it will be useful that this range is limited to a discrete determinable set, where differences between types do matter.

We have indicated that personality Mindset congruencies are in principle possible along each axis and on each plane of Figure 5. But, for them to exist there is a need for them to arise as stable combinations, something that depends on the current state of cultural values. We have said that these congruencies will be related to the values that the cultural trait of the agency takes. Sorokin (1962) noted that when the Sensate and Ideational enantiomers reach a common balance the *Idealistic* state arises. In this case neither Sensate nor Ideational values dominate, but rather a synergy occurs between them so that both forms of value sets are regarded as valid in society. Thus, Ideational people might find themselves in significant social roles just as people with Sensate values, a situation not possible in a predominantly Ideational or Sensate culture. These roles will depend on the strengths of the individuals.

Since under normal conditions cultural trait values operate as an attractor for personality, the Mindset values adopted are a reflection of the cultural trait, with either a tendency towards Individualism or Collectivism. The emergence of variations within Individualism or Collectivism in a given agency likely is a function of the 'fine tuning' within a culture that may relate to desired goals and *Outcomes*, i.e. achievements and possible distortions through one-sided action.

It has been indicated that the agency is not only composed of a normative personality, but also has a cultural and social system. These both have representative traits, each of which adopts epistemic enantiomer values. These traits and their enantiomers are shown in Table 6.

The cultural trait maintains an agency field that biases it towards either Individualism or Collectivism, depending on the value taken up by the cultural trait. Thus when the cultural trait takes an Ideational value the normative personality takes an Collectivist mindset, and when the cultural trait takes a Sensate value normative personality takes a Individualist value. Similarly, an Ideational value for the cultural trait results in a Patternerning social trait value while a Sensate value results in a Dramatising value, determining in the end whether an agency might be either say creative or instrumentalist, or whether they might operate together synergistically according

to cultural conditions, this resulting in innovative material outputs typical of socio-industrial revolutions.

Table 6. Cultural and Social Traits and their Polar Enantiomer Values.

Trait	Enantiomer	Nature	Key words/ Values
Cultural	**Sensate**	Reality is sensory and material, pragmatism is normal, there is an interest in becoming rather than being, and happiness is paramount. People are externally oriented and tend to be instrumental and empiricism is important.	The senses, utilitarianism, materialism, becoming, process, change, flux, evolution, progress, transformation, pragmatism, temporal.
	Ideational	Reality is super-sensory, morality is unconditional, tradition is of importance, there is a tendency toward creation, and examination of self.	Super-sensory, spirituality, humanitarianism, self-deprivation, creativity of ideas, eternal.
Social	**Dramatism**	Individual relationships to others are important, constituted as sequences of interpersonal events. Communication is important, as are individuals and their proprietary belief systems, and individual social contracts. Goal formation should be for individual benefit**.** Ideocentric agencies are important, operating through social contracts between the rational wills of its individual members.	Sequenciality, communication, individualism, contractual, ideocentric.
	Patternism	Configurations are important in social and other forms of relationships. There is persistent curiosity. The social is influenced by relationships with individuals. Some importance is attached to symmetry, pattern, balance, and the dynamics of relationships. Gaol seeking should be for collective benefit, and collective gaol formation takes precedence over personal gaol formation. Allocentric collectives are important, where the members operate subjectively.	Configurations, relationships, symmetry, pattern, balance, dynamics, collectivism, allocentric.

5. RELATING MINDSET TYPES TO SUSTAINABILITY PARADIGMS

Mensah & Castro (2004: 2) distinguished between the two broad groupings that support paradigms of sustainability, and suggested that the optimists tend to centre on economists and related others, while the pessimists on ecologists and related others. While for many economics is identified with Individualism (Davis, Marciano & Runde, 2004: 21), not all economists are Individualists, and by this token, also optimists. Nozick (1977: 359; cited in Davis, Marciano & Runde, 2004: 121) identifies two frames of reference in economics, these are Methodological individualism and Collectivistic methodological institutionalism. By the same token, it is likely that there will also be variation in the paradigms being supported by ecologists and related others. This leads one back to the original interest in this paper, understanding the generic bases for the paradigms of sustainability. In Table 1 two opposing paradigms were identified, with an attempt at creating some in-between paradigm. Making an epistemic comparison between Table 1 and Tables 2 and 4 now provides a basis for a comparison between Mindsets and the egocentric/ecocentric paradigms of sustainability. To do this we shall use a technique called

"epistemic mapping" which will make epistemic keyword comparisons between Individualism/Collectivism and ecocentric/egocentric sustainability in order to obtain their connection if any. To do this the epistemic values identified by Gladwin, Kennelly, & Krause (1995) for the paradigms of sustainability will be used as shown in Table 1, and the trait enantiomers for culture, social and normative personality orientations have been assembled and shown in Table 7.

Table 7. Broad relationships between Mindset Trait enantiomers and susceptibility paradigm values.

Trait Enantiomer	Epistemic Values	Technocentrism Values	Ecocentrism Values
Culture			
Sensate	The senses, utilitarianism, materialism, becoming, process, change, flux, evolution, progress, transformation, pragmatism, temporal	Materialism, Exploit/convert	
Ideational	Super-sensory, spirituality, humanitarianism, self-deprivation, creativity of ideas, eternal		Spiritualism, antimaterialism
Normative Personality			
Intellectual Autonomy	Autonomy, creativity, expressivity, curiosity, broadmindedness.	No limits, Atomistic, disassociation	
Embeddedness	Polite, obedient, forgiving, respect tradition, self-discipline, moderate, social order, family security, protect my public image, national security, honour elders, reciprocation of favours.		Intrinsicalism
Mastery & Affective Autonomy	Ambition, success, daring, competence, exciting life, enjoying live, varied life, pleasure, and self-indulgence. **&** Acceptance of position in life, world at peace, protect environment, unity with nature, world of beauty.	Atomistic, disassociation, anthropocentrism	
Harmony	Acceptance of portion in life, world at peace, protect environment, unity with nature, world of beauty.		Heterarchical, Ecological integrity, whole earth
Hierarchy	Quality, social justice, responsibility, honesty, loyal, equality, honesty, helpful, cooperation	Hierarchical, vast machine, domination, centralised	
Egalitarianism	Loyal, equality, responsible, honest, social justice, helpful		Ecological integrity, Redistribution, Indisassociation
Social Trait			
Dramatism	Sequenciality, communication, individualism, contractual, ideocentric	Narrow homocentric, Egoist-rational, free market,	
Patternism	Configurations, relationships, symmetry, pattern, balance, dynamics, collectivism, allocentric		Whole earth, highly vulnerable, complements

The ecocentrism and technocentrism (egocentrism) polar opposite paradigms identified by Gladwin, Kennelly, & Krause (1995) may be considered to be catch-all entities. However, while they may be paradigms in the scientific sense of the word, they only constitute attributes of Mindsets that agencies adopt and maintain. Specific agencies will adopt Mindset types that do not capture all of these elements, or there may be balances between the polar enantiomers that result in compound Mindset types.

Since these enantiomers are associated with different Mindset types that broadly collect under Individualism and Collectivism, it is also clear that not all perspectives on sustainability are either in the extreme polar optimist or pessimist camps. These comparisons indicate that there are some components of the ecocentric sustainability paradigm that are related to forms of Individualism, as there are some components of the egocentric paradigm that are related to Collectivism.

6. CONCLUSIONS

The apparent current consensus in some part of the organisational theory community is that ideas of sustainability are subject to ideological controversy and intellectual turmoil, and until this changes it cannot be said if this is a sustainable concept or not. In order to understand this, some authors have attempted to explore the paradigmatic distinctions that have arisen. In this paper a distinction has been made between egocentric and ecocentric perspectives. In doing this reference has been made to Mensah & Castro (2004) who referred to two diametrically opposite paradigms that they referred to as *ecocentric* and *optimistic*. Similarly Gladwin, Kennelly & Krause (1995) have sought to characterise in detail the values associated with these two paradigms, which they have called *technocentrism* and *ecocentrism*, identifying for each a set of distinct epistemic values. They then showed that it was possible to have some in-between paradigm that they referred to as *sustaincentrism*, having epistemic values that were some balance between the two extreme paradigms that might be a strategy for the future if these values could be embraced generally.

This paper has not only attempted to show how much variation there is in the concept of sustainability, but it has also sought show that it is possible to identify generically what type of personality might hold which values that are associated with sustainability. To do this the schema of cybernetic agency theory was adopted, designed to make inquiries into organisational structures and processes. This schema takes a broadly viable approach, and sustainability is seen as a strategic process that derives from agency policy options. Goals are influenced by ideology and ethics, where ideology may embrace either egocentrism or ecocentricism. This agency is trait based, the traits operating as agency controllers. Coupling this with Mindset theory enables modes of collective thought and related patterns of behaviour to be identified and associated with epistemic types for any agency. Mindset types have been related to the sustainability paradigms, and it has been shown that the attributes of each of the opposing paradigms can be distinguished into Individualistic and Collectivistic agency orientations. However, Individualism and Collectivism are very broad concepts, and distinct agency Mindset types maintain broad associations with each of these orientations. As a result, a whole variety of views about sustainability are discernable across all of the possible Mindset types, not only the three paradigms indicated by Gladwin, Kennelly & Krause. From Mindset theory there are at least eight, and likely many more in the case that some Mindset types meet as congruent mode of thought.

It is through Mindsets that strategy, policy and behaviours are developed. Therefore, there is need to find coherent understanding of what sustainability means, or the argument by Lutz Newton & Freyfogle (2005) that the 'concept of sustainability' is not sustainable will prove to be true.

The core message of this paper is that "sustainability" by itself is an ideological concept with different meanings for different people that reflect their different values and goals.
However, during the journey to this conclusion, a number of significant ideas surface. Given that an agency's cultural orientation can be assessed, then its general orientation towards Individualist or Collectivist can be anticipated. Further, given that agency context is known and its Mindset types can be empirically identified, then (under normal non-pathological conditions) one can anticipate the type of Individualism/ Collectivism of an agency, its views on sustainability, and its likely patterns of behaviour.

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ENDNOTES

1. Autopoiesis (Schwarz, 1997; Maturana and Varela, 1987) explains how a "living system" self-produces its core relational explanations of reality that influence behaviour. This defines for the personality system its own boundaries relative to its environment, develops its own unifying operational code, implements its own programmes, reproduces its own elements in a closed circuit, obeys its own laws of behaviour, and potentially satisfies its own intentions (Jessup, 1990). It also self-produces the network of processes that enable it to produce its own personality components that exist in cognitive, figurative and operative bases.
2. Autogenesis is a second order form of autopoiesis (Schwarz, 1997) that has a higher level of processes - that is meta-processes that may be represented for instance as guiding personality convictions, principle influences, or even spirit. It occurs when a selectable network of these meta-processes is able to project into the operative couple a set of espoused values as attitudes and mental schemas and operative personality patterns. In effect autogenesis defines the autonomous system through the creation of its own set of laws.

www.business-systems-review.org

Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

Can Advancements in Economic and Managerial Practice be achieved without Systems Thinking Education as the Foundation?

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Submitted: March 1, 2014- Published: August, 12, 2014
DOI: 10.7350/BSR.D07.2014 – URL: http://dx.medra.org/10.7350/BSR.D07.2014

ABSTRACT

Complex economic and managerial problems cannot be solved anymore with traditional single discipline and linear thinking mindsets. Employers will therefore increasingly require their employees to have the capacity to redesign in systems and sustainability terms. In other words, there is an increasing demand for society to move away from linear thinking that often leads to "quick fixes" that do not last, to a new way of thinking that is systems-based. Understanding the principles of interconnectedness, feedback and leverage points in systems and appreciating the value of cross-sectoral/disciplinary communication and collaboration are the only ways in which society will be able to find long lasting, sustainable solutions to the many problems we are facing. Developing such an understanding in order to address complex economic and managerial challenges, requires a strong level of awareness of the value of knowledge on systems approaches and tools that will increase the demand for systems education.
However, it is evident in many institutions worldwide that the establishment of systems education is a highly complex task. The Evolutionary Learning Laboratory (ELLab) for dealing with complex issues was therefore used to establish an ELLab for systems education in the Adelaide

University Business School. This caused a revolution regarding the integration of systems concepts into discipline specific courses and the development of standalone core systems courses that will help to instill those graduate attributes that industry wants. The ELLab consists of seven steps, starting with the gathering and integration of the mental models of all stakeholders (academics, industry and government departments), followed by capacity building of lecturers, participatory processes to identify graduate attributes and course contents, course offerings (implementation) and a reflection (through questionnaires, analysis and discussion) on the degree to which these graduate attributes are being achieved. The reflection step of the first round in 2013 of the cyclic process of implementation, reflection and adapting the course contents or modes of delivery, has revealed that students have shifted their way of thinking significantly from limited understanding and linear thinking to more coherent and interconnected thinking. During the pre-learning phase one third of the students were inclined to jump to the solution (i.e. treating the symptoms and "quick fixes"). After completing the course nearly 60 percent of the students mentioned the use of their knowledge on systems-based approaches, highlighting the system component interactions, unintended consequences, leverage points and systemic interventions. There was a clear improvement of the knowledge on interconnected thinking and how to deal with complexity and a change in their attitude towards the course. Significant changes also occur in their skill levels (capability to use system tools) and their aspirations (willing- and eagerness to apply their learnings). Based on the survey results and analyses, it could be concluded that systems thinking education can be regarded as the leverage or systemic intervention for being able to take action towards the advancement of economic and managerial practices to improve knowledge, attitude, skills and aspirations. The vision is to link the Adelaide ELLab globally with other institutions that are involved with systems education.

***Keywords**:* Systems Thinking education; Evolutionary Learning Laboratory; Complex problems; New way of thinking; Systems in practice; Systems tools; Co-learning; Graduate attributes; New era MBA; Global Evolutionary Learning Laboratory (GELL); Cross-institutional collaboration; Problem solving; Root causes; Holistic approach; Multi-stakeholder involvement; Capacity for change.

1. INTRODUCTION

The question posed in the title of this paper probably has a quick and clear answer – "no". However, rectifying the situation requires a total change in the way society is thinking. Complex economic and managerial problems cannot be solved anymore with traditional single discipline and linear thinking mindsets. These problems are multi-dimensional and involve different disciplines and stakeholders with varying goals and aspirations. The problems facing our society today also have to be solved in an environment of high levels of uncertainty and risk. Add the lack of capacity of our social, political and economic constructs, it becomes almost an impossible task to rapidly redesign for the new world we are living in.

However, is it that easy to change the mindset of society towards a new way of thinking? This capacity to redesign, in systems and sustainability terms, will increasingly be what society and employers will require from new people entering the workforce – a "requirement" that has become one of the biggest challenges for education in this century. It is not sufficient anymore in today's complex society for graduates to only have a deep understanding of the disciplines they

study. They need to fully understand how their disciplines fit into societal and global systems in a century when humanity will meet ever more limits.

These issues create a significant pedagogical challenge in that current university education tends to be focused on discipline specific teaching which has no room for a wider systems approach. Didactic autonomous discipline based courses fail to foster a social networking culture of interactions between students in different disciplines. This has been proven to enhance the process of deep learning. We need innovative curriculum designs and learning environments that address academic paradigms as well as industry requirements.

One would think that the value of Systems Thinking in dealing with the complexities in this turbulent 21st Century would by now have been recognised; especially the fact that it offers a holistic and integrative way of appreciating all the major dimensions of a complex problem, and enables the formation of effective management strategies (systemic interventions) with long lasting outcomes. Furthermore, systems thinking is not a new concept. It is not easy to identify the precise beginning of the Systems Thinking field, as the beginning is a matter of perspective. For example, M'Pherson (1974) traces elements of Systems Thinking back to the work of Aristotle, while Midgley (2000, 2006) suggests that the field and study of systems began in the early 20th century with either Alexander Bogdanov (1913-1917) or Ludwig von Bertalanffy (1956, 1962). Systems thinking is also being applied for a long time. Several publications (Francois, 2004; Jackson, 2003; Midgley, 2003) offer a 'rich storehouse' of different systems approaches and inclusive sources about the Systems Thinking concepts. It is widely acknowledged in the literature that Checkland (1981, 1999) and Senge (1990, 2006) have proposed influential Systems Thinking approaches.

In spite of its extensive application, Systems Thinking has mostly been used and applied by systems scientists and some academics. The applications of Systems Thinking by policy makers, managers, practitioners, and ordinary people remain limited (Nguyen et al., 2012).

Bosch, Nguyen et al. (2013a) identified three major systems based approaches (leverages) to help current and create future managers and leaders to be equipped with new ways of thinking that are systems design-led to deal with complex problems in a systemic, integrated and collaborative fashion: 1) the establishment of Evolutionary Learning Laboratories (ELLabs) for dealing with complex issues; 2) "Starting with the Young" (systems education at school level) to create a "new way of thinking" in any society or organisation and 3) enhancing Systems Thinking education at tertiary level.

A recent paper provides a comprehensive description of the first systems based approach and its application in four case studies (Bosch et al., 2013a). The generic application of the ELLab approach has also been reported in several other publications (currently under review). A paper on "Starting with the Young" was presented at the 57th conference of the International Society for Systems Sciences (Nguyen & Bosch, 2013a), describing how gamification is being used at school level in various parts of the world to create an awareness of the importance of systems and interconnected thinking from a young age (second leverage). This paper elaborates on the third leverage point mentioned above, namely the enhancement of systems education at tertiary level as a prerequisite for the advancement of economic and managerial practice. The paper also indicates how the first systems-based approach (ELLabs) is being used as a mechanism for achieving the third.

2. CURRENT STATE OF SYSTEMS THINKING EDUCATION

2.1 Difficulties to introduce systems education

Herrscher (1995) has observed that proposals are often made to universities to include systems theory or thinking in the curriculum. In all cases, the university's President was highly in favour of the project, but when it came to implementation, he had to rely on one of his Faculty or Department Deans. However, this is where it became difficult. Deans are 'area oriented', i.e. there is no Dean in charge of 'overall wisdom' or 'general knowledge'. In most cases, the proposal already died at the first step, when deciding which 'specialised area' should handle this 'unspecialised' teaching and research (Herrscher, 1995).

Herrscher's observation was noted almost two decades ago. Unfortunately, things have not changed. Recently, the then President of the International Society for the Systems Sciences stated that: "… there are remarkably few institutions in systems science that have proven to be stable and robust enough to outlive their creators for long. Deans step in and dismantle what they do not understand, taking the money for their discipline-centred favourites" (Allen, 2009, p.3)

The difficulty to establish systems education is evident in many institutions worldwide. Examples in Australia include three very successful systems groups in three large Australian universities that have been 'disestablished' due to the 'silo' and 'discipline' oriented strategy of senior managers at those institutions.

The first group had achieved huge successes in the late 1980s and early 1990s in introducing Systems Thinking and practices in the education of agriculturalists (Bawden et al., 1984), systems programs (Bawden, 1991), and systems approaches to agricultural development (Bawden, 1992). Unfortunately, this innovative "systems agriculture paradigm" is barely alive today (Patterson, 2007). The second group (the Systemic and Action Research group) had also been very active and successful in the late 1990s and early 2000s. This group is now sharing the same fate with the first group.

A third group had done extremely well in the first decade of the 21st century through a school that was dedicated to systems learning, discovery and service (Bosch et al., 2007; e.g. Bosch et al., 2003; Nguyen & Bosch, 2013b; Nguyen et al., 2011; Nguyen et al., 2012; Smith et al., 2007). For example, one of its Systems Thinking courses commenced with 11 enrolments in 2009. The enrolments increased to 109 in 2010 and 151 in 2011. This course has been taken by students from all different Faculties, some of them as a compulsory course, but most (more than 80 percent) as an elective. Unfortunately, the school had been disestablished in 2011 and amalgamated with an agricultural school. As integrative systems are a generic discipline with applications in any area of interest, the agricultural "labelling" significantly jeopardised the vision and scope of activities of the systems scientists – a clear demonstration of (Herrscher, 1995))'s point on the difficulties involved in deciding "which 'specialised area' should handle this 'unspecialised' teaching and research".

2.2 Some examples of successful introduction of systems education

Even though it is not yet well recognised in the same way as other disciplines, there are currently various systems courses and programs being offered world-wide. In the USA, examples include various systems courses which have been offered at the Massachusetts Institute of Technology, the K-12 System Dynamics projects (Forrester, 2007a, 2007b), the ThinkBlocks program

(Cabrera, 2008), and various courses offered in-house or at different Universities. In the UK, various systems courses and program have been or currently being offered by the Open University, London School of Economics, Lancaster University, and by the Centre for Systems Studies at Hull University. There are also various systems courses and programs offered at Universities in countries such as Germany (Blokland & Schumacher, 1990; Klieme & Maichle, 1994), Austria (Brock & Janischewski, 2011), Japan (Kohtake et al., 2010; Takahashi & Takashi, 2011), China (Gu et al., 2002), Switzerland, Slovenia, and Italy.

In Australia, Systems Thinking is a core course in relatively few programs, mainly in business schools. Examples are the MBA program at the University of Adelaide Business School and the Queensland University of Technology Business School. There are also Systems Thinking courses offered at other Universities such as the University of South Australia, The University of Queensland and Monash University, but mostly as an elective.

Of particular importance is also the suggestions that Systems Thinking should be taught to children from an early age (Sweeney, 2001); Evagorou et al. (2009). Results from a study with middle school students (Assaraf & Orion, 2005) indicate that most of them encounter difficulties in all aspects of Systems Thinking, even in the very basic ones. According to Jacobson and Wilensky (2006), even university students tend to solve complex systems problems using simplistic arguments. It is suggested that skills for comprehending the structure and the visible aspects of the behaviour of a system are most easily acquired by young students (Hmelo-Silver & Pfeffer, 2004), and Systems Thinking skills are important in helping younger students understand many complex relationships that exist in the natural and social world (Maani & Maharraj, 2004). Evagorou et al. (2009) reviewed the work of many researchers and educators, highlighting the importance of elaborating Systems Thinking skills in the learning routine of specific scientific fields such as ecology, physics, and social sciences as a prerequisite for conceptual understanding of the topics taught (Hogan & Thomas, 2001; Klopfer & Resnick, 2003; Stieff & Wilensky, 2003; Wilensky & Reisman, 2006). However, Evagorou et al. (2009) claim that there are limited resources for teaching systemic thinking within science, especially for younger students. They also argue that learning about complex systems has proven difficult to improve under current educational settings. This argument is supported by many studies reported in the literature (National Research Council., 2000; Penner, 2000; Richmond, 2001; Sheehy et al., 2000).

2.3 Making progress

The International Federation for Systems Research (IFSR) has dedicated two of its recent biennial Conversations (Fuschl in 2008 and Pernegg in 2010) to the discussion of systems education. The 2008 IFSR Conversation provided valuable insights into the ways in which different systems concepts could be matched with different types of systems education for different types of students (Bosch et al., 2009). An outcome from this Conversation was the development of a Systems Education Matrix - a useful tool for educators charged with designing new university-level curricula that effectively integrate systems concepts and/or teach those concepts explicitly. A full description of this matrix is provided in a recent paper by (Bosch et al., 2013b).

The outcomes of the 2008 IFSR Conversation were followed-up during the 2010 IFSR Conversation with the development of frameworks and modules for introductory and advanced systems courses. The intended learning outcomes of an introductory and an advanced systems course are also summarized in the aforementioned publication (Bosch et al., 2013b).

3. EVOLUTIONARY LEARNING LABORATORY FOR SYSTEMS THINKING EDUCATION.

3.1 Establishing an ELLab for Systems education at the University of Adelaide, Australia

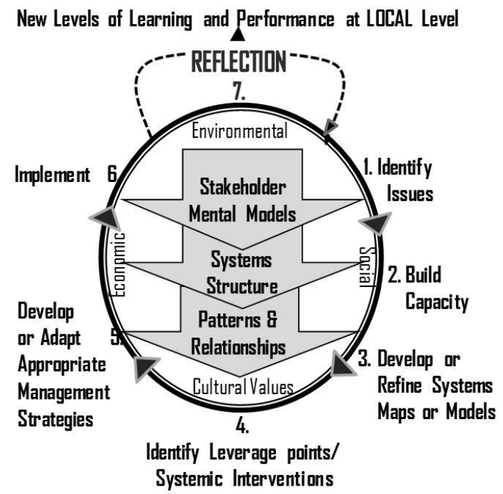
A revolution is taking place at the University of Adelaide's Business School in Australia regarding the integration of systems concepts into discipline specific courses. This revolution has been driven mainly by the need to:

- Educate students who can deal with the complexities of integrating environmental, social, economic and business components associated with the development of sustainable management systems and the creation of new era leadership. This demand for a systems-based focus on sustainability is very rapidly increasing in Australian society as well as globally, and there is thus a great need to provide educational platforms that bring together the concepts of sustainability, social responsibility and systems – in physical terms, social constructs (institutional, community) and using all the tools of our economic and legal worlds (business systems, economic instruments, regulation and pricing constructs). There is thus a clear need for systems scientists to deal with the complexities involved in such integration, as the knowledge and skills required cannot be obtained through some fragmented attempts to include concepts of Systems Thinking and sustainability in individual courses or the programs of a few university schools;
- Instil Systems Thinking attributes in graduates. Industry requires particular attributes from future graduates that will enable them to operate fully and effectively in our turbulent 21st century knowledge society. University Schools should play an active role in enhancing the educational experience of students by focusing on high quality programs and developing a high degree of work-readiness of graduates through incorporating courses that will enhance personal and professional skills. Systems approaches are important mechanisms to help achieve the attributes that industry wants from future graduates - for example, the ability to contextualize (Systems Thinking skills), to identify issues, develop strategies, managing projects (unravelling complexity and problem solving models), convey the message (communication), to build effective networks and work in teams (personal and collaborative skills), the ability to build resilience and being adaptable and socially responsible (dealing with change, complexity and impacts on the human dimensions of systems), and appreciate the need for lifelong learning (self-learning capability). These attributes can be instilled through developing a deeper knowledge of Systems Thinking approaches, without having to become a systems scientist.

The IFSR Conversations led to a major step forward towards introducing systems education worldwide into University systems. This task has been recognised as a highly complex problem and it was decided to use the generic Evolutionary Learning Laboratories (ELLab) process for dealing with complex issues as a mechanism for achieving this goal. The establishment of ELLabs has proven to be an innovative and effective approach (Bosch et al., 2013a; Nguyen & Bosch, 2013b; Nguyen et al., 2011) for unravelling and managing complex multidimensional issues. Bosch et al. (2013a) describes the ELLab as a series of steps that enables diverse groups of participants, all with different mental models, to engage in a cyclical process of thinking, planning, action and reflection of collective learning towards a common vision or goal - learning

together in an 'experimenting laboratory' environment about how best to deal with the complex problem they are facing (Figure 1).

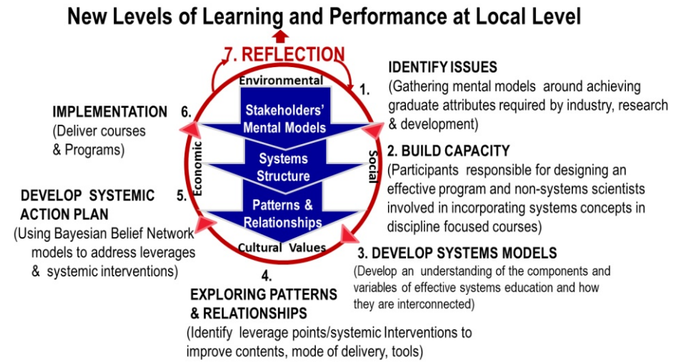
Figure 1. Evolutionary Learning Laboratories for dealing with complex issues.



Source: Bosch et al 2013a.

The seven unique steps were slightly adapted for establishing ELLab for Systems Education. For example, instead of developing appropriate management strategies in Step 5, the ELLab for Systems Education uses this step to develop a plan of what the contents of the courses will be, what order the modules within the courses will be offered, etc. to achieve the graduate attributes that were identified (Figure 2).

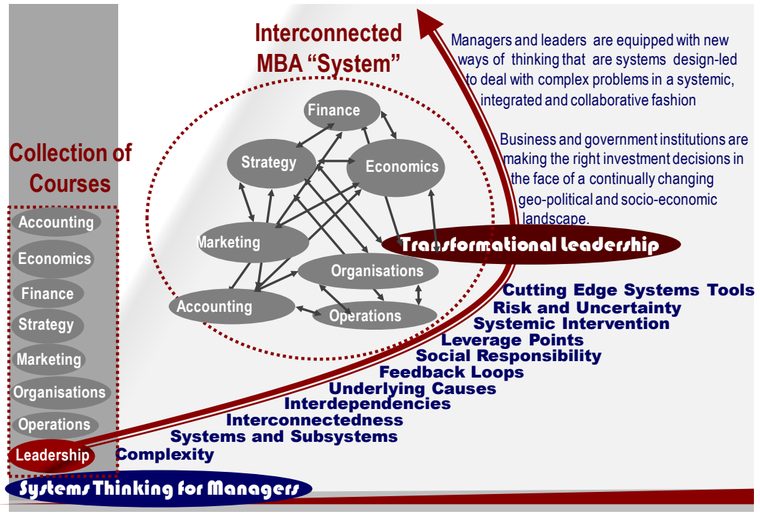
Figure 2. University of Adelaide Evolutionary Learning Laboratory for Effective Systems Education.



3.2 Some preliminary results of the Adelaide ELLab for Systems Thinking Education in operation.

The Adelaide MBA is an excellent example of the incorporation of introductory and advanced courses in redesigning it as a "new era" degree program that is not regarded as merely a collection of courses, but as a "system" in which the various courses are strongly interconnected (Figure 3). This has been explained in detail in a recent paper (Bosch et al., 2013b).

Figure 3. Systems based New Era Adelaide MBA.

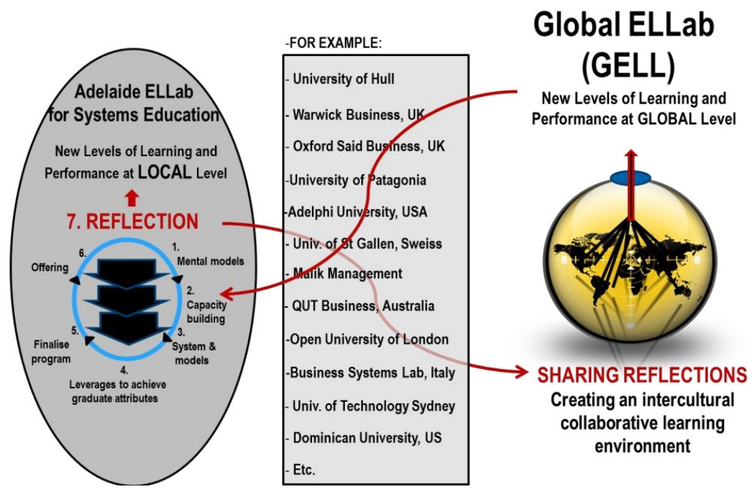


Source: Bosch et al 2013a

The MBA and B. Commerce 'systems' have been established as an ELLab (Figure 2). As mentioned earlier, the ELLab is used as a systems-based methodology and process for integrated cross-sectoral/disciplinary communication, decision making, planning and collaborations in dealing with complex problems. It is used by all involved to develop a deep understanding of the under and post-graduate 'systems' (program contents and delivery), shared vision (learning outcomes) and skills for systemic continuous adaption, innovation and improvement of the new era MBA and systems courses in the B. Com. programs over time, ensuring in this way their contents and modes of delivery remain viable and relevant.
The cyclic process includes different steps as illustrated in Figure 2. In summary, it starts with gathering the mental models of all lecturers and people from industry (job providers) on the nature of the graduate attributes that are required and possible concepts to be included in the course enhancing the capacity of lecturers involved to develop an understanding of the interconnectedness of all components of the MBA and B.Com. systems (programs). The program is then designed and the mental models of all involved on how the contents can be adapted and

especially how learnings can be integrated (contents, mechanisms of delivery, nature of student activities etc.) are determined. After this is the implementation stage (actual offering of the program), which is followed by reflection (co-learning, adaption and the cycle repeats itself) (Bosch et al. 2013b).
The vision is to link the Adelaide ELLab globally with other institutions that are involved with systems education in order to share the lessons learned through frequent reflections on student experience, degree in which graduate attributes are achieved, order of module delivery, value of practical sessions and relevance of the contents with lessons learned in other institutions. Lessons learned in one ELLab enhance the levels of learning and performance locally, while such a worldwide sharing through the Global Evolutionary Learning Laboratory (GELL) (Figure 4) would lead to new levels of learning at the global level. GELL will also provide an opportunity for individual institutions to contribute to the global knowledge pool on systems education. The ELLab concept and creation of a platform for sharing and co-learning are currently being developed as a web-based system (Think2Impact™[1]). This system will make cross-institutional sharing of reflections and co-learning at local and global levels possible without face to face meetings.

Figure 4. Linking the Adelaide Evolutionary Learning Laboratory for Systems Education globally to other institutions.



Source: Adapted from Bosch et al., 2013b

[1] *This project is currently underway under the auspices of the International Centre for Complex Program Management in Canberra, Australia. Launching of the system is expected to be in July 2015. See www.think2impact.org for more information.*

3.3 Preliminary results from the reflection step in the Adelaide ELLab for Systems education.

Two Systems Thinking courses have been developed and offered at the University of Adelaide in 2013. These include an undergraduate course (Systems Thinking for a Complex World II) - a core course for the Bachelor of Commerce program and a postgraduate course (Systems Thinking for Management) - a core course for the Master of Business Administration (MBA) program. The frameworks and modules of these courses have been developed in line with the outcomes and findings of the 2008 and 2010 IFSR (Bosch et al., 2009; 2013b). Step 1 of the ELLab led to a similar set of learning objectives for the two courses:

1. Understand that issues facing the world are complex and multi-dimensional, straddle many different factors and involve diverse multi-stakeholder systems;
2. Understand the context in which the problems arise (culture, political systems, values) and how disciplines or areas of interest fit into the whole;
3. Understand how different disciplines are interconnected and interdependent;
4. Obtain skills to address the underlying root causes rather than the symptoms of a problem;
5. Identify positive and negative feedback across components of a system;
6. Obtain skills to address problems that appear to be intractable;
7. Understand how the changing nature of the world impacts upon the way in which people and organisations make decisions;
8. Identify key leverage points for systemic interventions and to interpret their managerial implications in diverse application areas; and
9. Apply, through a real life project, concepts of systems thinking and some cutting edge tools in understanding and effectively managing complex problems in various areas and contexts.

These learning objectives are expected to provide students with the graduate attributes desired by potential employers. Pre-learning and post-learning surveys were conducted before the commencement and immediately after the completion of the courses for use during the reflection step. The main aim of the surveys was to explore to what extent the learning objectives have been achieved. The survey questions were designed to identify any changes in the students' way of thinking and systems knowledge after completing the systems thinking course. The same 10 questions were used in both surveys with 27 participating students. They include:

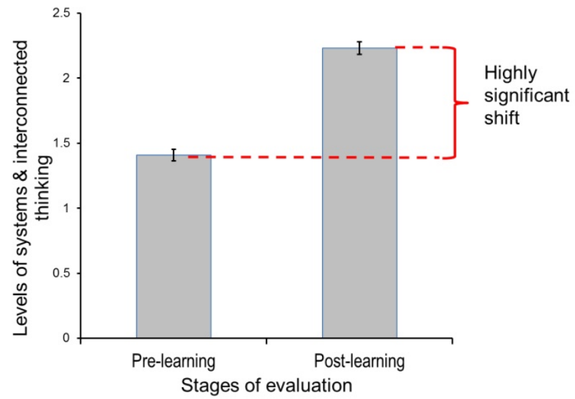
1. What would you regard as the first prerequisite for solving a difficult problem?
2. Why do you agree that it would be better for each country to solve their own problems by themselves?
3. What do you think about the general statement that: "The best solution to a problem in a specific area of interest/discipline will come from experts in that discipline/area of interest"?
4. How would you solve the symptoms of a problem? (E.g. how would you reduce the high crime rate in Shanghai?)

5. What do you understand by the concept of feedback between components of a system?
6. What do you think about the fact that an intractable problem should become part of the management environment rather than to waste time on solving that problem?
7. What do you think about the statement that: "Individual organisations or companies cannot take the changing nature of the world into account when they have to solve a problem that relates only to their own organisation or company"?
8. Why do you agree that the best way of solving a difficult problem is to try out various strategies until you find one that works?
9. Are you aware of any systems tools that can help you to address a difficult problem? If yes, please name them.
10. Why did you decide to enroll in this course and are you happy that you are sitting here today?

The levels of understanding systems concepts and interconnected thinking has been evaluated by using four levels to score the responses (3: advanced, 2: moderate, 1: limited, and 0: no understanding). Half band scores were applied for more accurate results. The encoded data were analysed using the General Linear Model procedure in the Minitab® statistical package (version 15, Minitab Inc., PA, U.S.A.). Additionally, the students' knowledge, attitudes, skills and aspirations as the elements of Bennett's "KASA" change evaluation (Bennett, 1975; Rockwell & Bennett, 2004) were assessed with both "hard" and "soft" indicators throughout the course duration (personal and group learning reflections).

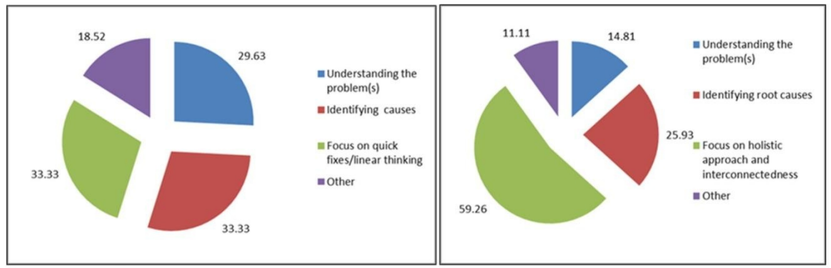
It was evident that overall the students' way of thinking have changed significantly from an average of 1.4 (± 0.05) to 2.2 (± 0.05) ($P < 0.001$) (Figure 5). No significant differences (at $P < 0.05$) were found among gender groups and study program levels.

Figure 5. Average shifts of the students' systems knowledge and perceptions after completing the systems thinking course. (The vertical bars (I) represent the Standard Errors (SE).)



The largest shift was evident from the responses of the students to Question 1, namely from a limited understanding and thinking in a linear way (0.96 ± 0.11) to a more coherent and interconnected way of thinking with an average score of 2.44 ± 0.11 ($P < 0.001$). The comparison is illustrated in the two pie charts below.

Figure 6. Comparison of the students' way of thinking and approaches to problem solving before and after the systems thinking course.



(a) Pre-learning stage (b) Post-learning stage

(Note: the total percentage is greater than 100% because one student responded with several ideas).

Figure 6 clearly indicates that 33.3 percent of the students were inclined to jump to the solution (i.e. treating the symptoms and "quick fixes") at the pre-learning stage. Only 3 students out of the 27 mentioned the importance of identifying the root causes. Interesting, after completing the courses nearly 60 percent of the students mentioned systems-based approaches, highlighting the system component interactions, root causes, unintended consequences, leverage points and systemic interventions.

In terms of the knowledge of system tools prior to the course commencement, only 14.8% of the students were aware of some systems tools. Three students at graduate level, who had prior work experience, mentioned tools such as "Lean and Agile SixSigma (Christopher & Rutherford, 2004; Thomas et al., 2008), "Environmental Scan" (Morrison, 1992), the "Fishbone diagram" (Nair, 2011) and the "Five-Why's" technique (Murugaiah et al., 2010; Serrat, 2009). This pre-knowledge have influenced their motivation for taking the course and their learning attitude. At the beginning of the course, 74.1% students expressed their interest to gain new ways of thinking/approaches (51.9%) and tools/techniques (22.2%) to deal with intricate problems. The rest found the course description interesting and attractive ("new cutting edge material").

The students' learning attitudes were greatly positive during the course and through the class activities and group work. Through the questionnaire survey and personal and group learning reflections, it was found that 100% of the students experienced the course as enjoyable and was greatly satisfied with the new knowledge they obtained. Understanding the systems thinking approach and capability to use the systems tools and techniques have made them more confident. A group of MBA students realised the value of systems thinking as a generic approach that can be applied in any field. Another stated that "we are looking at the world in a very different way now". This would mean that they have developed a strong belief and positive attitude towards the application of systems thinking in their work and lives. Interestingly, four out of the seven Master

students had work experience prior to this course. These students reflected back on their work before they completed the course. They used to struggle with applying a holistic (systems) approach in solving problems. However, after the course they were very confident that they will now be able to improve their productivity and efficiency, since they have been equipped with the framework and new tools to work with. Two of these students also stated that they were frustrated and have been uncomfortable with the, simplistic, reductionist and linear thinking approaches being practiced in their workplaces – especially when it leads to expensive, yet ineffective solutions. They expressed a "great relief" and described the course as the "first wonderful experience of learning how the application of systems approaches can change the current way of operating". Senge (1990, pp139-140) argued that dissatisfaction with the current situation also creates a "source of energy" and/or "creative tension" to change and achieve an individual's vision. In adapting to this situation, the more the students feel uncomfortable with the reductionist tendency and linear thinking in solving complex problems in the workplace at present, the stronger will their motivation, willingness and positive attitudes become to look for a new approach and tools/techniques to prove that traditional approaches are not appropriate any more. The students found it fortunate that they have been provided with what they were expecting before the course. All of these evidences are proof of the positive attitude of the students towards systems thinking approaches and tools.

It is also important to distinguish between the term "education" (what universities are offering to students) and "training". The latter focuses on skill development, while the former is different in the ways it shapes the "attitude" in addition to knowledge and skills for learners (Fabri, 2008). Moreover, education helps learners to be more analytic, that is, students are being equipped with "know why" rather than only "know how" (Essenhigh, 2000). The students were therefore constantly encouraged during the systems thinking course to develop a more open attitude. That is, a more tolerant to divergent viewpoints and perspectives that is typical of complex problems that involve multiple stakeholders.

Although no student had used "Vensim®" (for causal loop modeling - (Ventana®, 2011)) and NeticaTM (for developing Bayesian Belief Network models -(Norsys, 2013)) before the course, all the students became competent users of these easy-to-use software packages through practical sessions and group learning projects. One of the Master students, an independent consultant with 20 years of experience, started to apply systems thinking and the new tools in consultancies immediately after completion of the course. This student described the course content and its applicability as a "fantastic experience". This reaction also implies that the systems tools and approaches presented in the course would be regarded as superior to those that have been used before.

Through the evaluation of students' satisfaction, personal and group learning reflections, it showed that 100 percent of the students developed positive aspirations and a high readiness to apply systems thinking approaches and new tools obtained in their future and/or current professional work in different areas such as business, consultancy, medical science, policy making in government and engineering. One graduate student, an experienced professional engineer, found the "true value" of systems thinking to be in the process itself, in which relevant stakeholders are engaged to share and integrate their different mental models and identifying the causal relationships.

The changes in knowledge, attitude, skills and aspiration (KASA change) as expressed by the students (words and phrases used in the second questionnaire) are summarized in Table 1:

Table 1. KASA change of the students after completion of the systems thinking course.

KASA elements	KASA change evidences
Knowledge	**Holistic approach** and **interconnected thinking**; enhanced **understanding of complexity**, changing nature of the world and the need for **multi-disciplinary** and **multi-stakeholder** involvement; guided (step-based) **frameworks for solving complex problems.**
Attitude	**Positive belief** that the systems thinking course has provided a **novel way of thinking** and approaches to **unravel complexity** and to **solve difficult problems**, while maintaining an understanding of how all the components are **interconnected**. Increased awareness of the **value of teamwork**, i.e. two brains work better than one", where the personal **mental models are shared**, improved and used to develop **shared visions**.
Skills	Capability to use **system tools for integrating diverse mental models**, identifying **systems archetypes**; **Causal Loop Modeling** (**feedback** cycles); **BBN modeling** for the development of **systemic management** and operational plans; improved **team work skills**.
Aspiration	Strong **willingness to apply systems tools** and approaches to real life situations.

We would argue that the students did not only achieve the knowledge and skills as outlined in the requirements within the course description, but also developed a higher level of learning for their future careers. Based on the actual survey results and the above analyses, it could be concluded that systems thinking education is certainly a major leverage for a change from traditional linear thinking and very often "mindless learning", which usually lead to the so called "quick fixes" or "treating the symptoms", to a more comprehensive and integrated systems thinking that eventually bring about long lasting sustainable outcomes/solutions. Mindlessness refers to the learning that relies on the previous experiences without reflections and lack of the openness to new perspectives (Mezirow, 2000).The shifts of all KASA elements from the above analyses are illustrated in Figure 7.

In mathematics, in fact in the real world, there are "necessary" and "sufficient" conditions (i.e. pre-requisites and/or requirements for something to happen) to fulfil a certain goal (Vapnik, 1999). We would therefore argue that systems thinking knowledge and skills would be the "necessary conditions" for the advancement in economic and managerial practices, while attitudes and aspiration (personal attributes) are the "sufficient ones". It is dependent on each individual's motivation and determination to gain a shift in the way he or she thinks, that is, whether they would practice a systems approach in their workplace and lives. Figure 8 illustrates how systems thinking education could contribute to the advancements in economic and managerial practices.

Figure 7. A descriptive (transformative) learning curve for future leaders and practitioners as a result of systems thinking education.

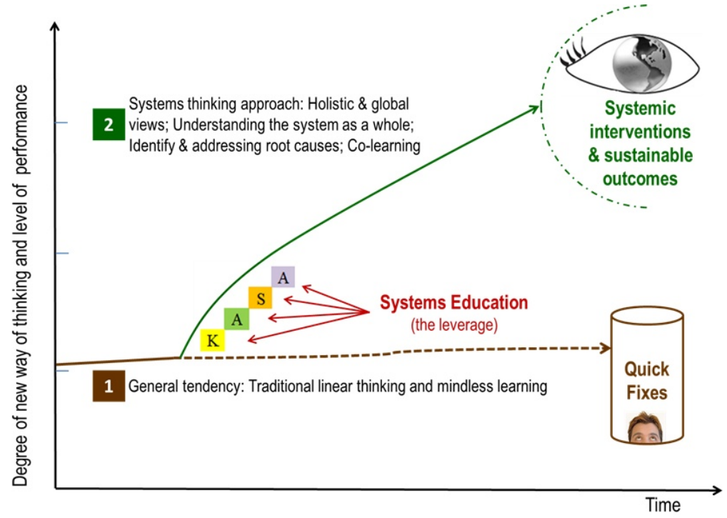
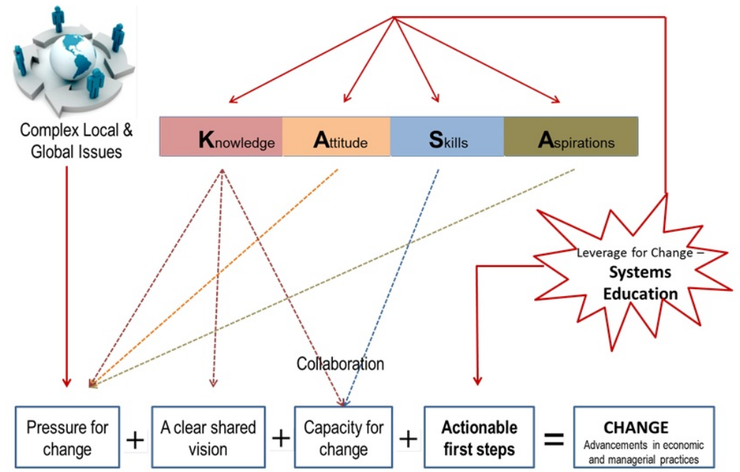


Figure 8. Systems thinking education as the leverage for advancements in economic and managerial practices.



Source: Modified from Beckhard, 1987 and Smith, 1997

Systems education could be regarded as the leverage or systemic intervention for being able to take action towards the advancement of economic and managerial practices to improve knowledge, attitude, skills and aspirations. The complex world we live in and the many complex problems we are facing in this turbulent and ever-changing 21st Century will increasingly become the driving force for acknowledging the importance of systems education.

4. CONCLUSIONS

The introduction started with a statement that advancements in economic and managerial practice cannot be achieved without systems thinking education as a foundation, but to rectify the situation will require the difficult task of a societal change in the way we think about problems or achieving positive outcomes. That is a change away from traditional single discipline and linear thinking mind sets to systems thinking and an appreciation of the interconnectedness between all components of the systems we are dealing with. Although difficult, this capacity to redesign, in systems and sustainability terms, has become increasingly what society and employers require.

Is this requirement such a big educational challenge? Not if there is a demand and awareness of how a holistic and integrative way of thinking could help economic and managerial challenges. Such a demand will further increase if the importance of taking all the major dimensions of a complex problem into account in the formulation of effective management strategies (systemic interventions) with long lasting outcomes can be demonstrated. This only becomes possible when systems scientists take their concepts and theories out into practice were it can make a difference.

There is still much needed to be done by systems scientists and systems educators in order to make Systems Thinking become popular and an integral part of the educational system. Apart from creating a demand, there are limited resources for teaching systemic thinking and it is difficult to improve these under current educational settings. However, it is expected that the slow “infiltration” of systems modules in discipline specific courses and full systems courses in various faculties will lead to a greater awareness of the value of systems education.

The worldwide introduction of systems education into University systems has been recognised as a complex problem, which justifies the use of the ELLab approach as a systems tool to deal with such a complex problem. The outcomes of the ELLab (capacity building, identification of leverages to achieve the learning objectives and the pre- and post-teaching reflections through student surveys, analyses and discussions) provided valuable insights for the Adelaide Business School’s systems courses. After only one year a big shift for all students could not be expected. However, the relatively large change in their thinking with sufficient knowledge and skills at this stage and the high levels of personal motivation and aspiration, would certainly contribute to significant changes in their future work. Having the opportunities to apply systems approaches and tools in “real-life situations” will further improve their knowledge and skills, increase the number of demonstrations of the value of systems and interconnected thinking and contribute widely through creating a better awareness and appreciation to systems thinking becoming an integral part of the way society thinks. When this is starting to happen we will be able to say that economic and managerial advancements have a systemic foundation. In other words decision and policy making will be based on solving the root causes of problems, identifying those components of the systems under consideration where investment decisions will have the biggest impact (improving cost-effectiveness of actions) and developing long lasting systemic and sustainable solutions to the many problems facing our society.

Involvement of more universities and other educational institutions in the Global ELLab for systems education will significantly contribute to co-learning from the global knowledge pool in order to enrich the contents of systems courses, optimise their impact through innovative modes of delivery and remain relevant and at the cutting edge. Such a worldwide collaboration will lead to a society with a new way of thinking, which is a prerequisite for meeting the economic and managerial challenges, now and in the future.

ACKNOWLEDGEMENTS

The authors wish to thank our many research collaborators in various countries and organisations in which they are practicing systems science. A special word of thanks to Dr Nguyen Van Thanh, Professor Dan Duc Hiep and the researchers and managers of the Cat Ba and Haiphong ELLabs in Vietnam; MBA Director Damian Scanlon and Dr Sam Wells for their continual support in encouraging the incorporation of systems approaches in the Adelaide MBA and management programs in general at the University of Adelaide; Professor Gandolfo Dominici for his continuing encouragement and acknowledgement of the importance of our work and the request and signing of an official agreement for collaboration between the Business Systems Lab and the Systems Design and Complexity Management Alliance. A special word of thanks also to various members of the ISSS and IFSR who respectively continue to support the enhancement of systems education globally through administering the Special Integration Groups and providing and funding opportunities for in depth Conversations on the topic of systems education.

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Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S.Lab International Symposium

The Index of Consumer Sentiment: A Tradition We Need To Revise

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Submitted: March 1, 2014- Published: August 12, 2014
DOI: 10.7350/BSR.D08.2014 – URL: http://dx.medra.org/10.7350/BSR.D08.2014

ABSTRACT

This paper provides a survey of the indices of Consumer Sentiment available in Italy and abroad. The critical review considers the questionnaires and sampling themes. The paper concludes with proposals to update the indices and the sampling framework.

Keywords*:* consumer sentiment; consumer orientation; confidence index.

1. THE PSYCHOLOGICAL COMPONENT IN CONSUMER ORIENTATION

The importance of predictions in economic behavior has struggled to establish itself. This is due to the illusion of a *homo oeconomicus* with the capacity to acquire all the relevant information and condense it in order to come to optimal decisions. This abstract model compares the human being to the most advanced computers which can single out the winning sequence of moves in the course of a game of chess. This is an ontological exclusion. In any case, the model is purely theoretical and empirically unsubstantiated.
Besides, Plato had already distinguished an emotional component in human behavior, which we see in the famous image of the black and white horses respectively portraying reason and instinct. All sorts of intense determining elements are associated with the rational register, rather like the tip of an iceberg which only represents a minuscule part of the mainly submerged structure.
The hypothesis of rational predictions presupposes that people use information efficiently and that the community as a whole provides accurate indications of this. But, as mentioned above, people also – and sometimes above all – act on, and react to, motivations and impulses inherent in underlying cognitive and emotional structures. These structures stem from experiences, from framework value systems and from the amalgam of individual needs and desires.
Indeed, the hypothesis of bounded rationality and authoritative opinions in information symmetries have failed to produce a consensus in literature[1].
A significant role in economic and social behaviors has been credited to elements such as the social climate and expectations.
Fukuyama (1996) views confidence as an expectation of an honest and cooperative behavior that develops within a community on the basis of rules shared by its members. But we will see

further on that confidence is also an important component of individual orientation in areas such as spending and saving.
The application of principles borrowed from psychoanalysis in consumer studies was fully established in the 1960s. At a more general level, in economic behavior the emphasis was later placed on various components. Indeed, opposing expectations and behaviors may even co-exist in the same person, rather like an oxymoron.
A component that associates irrational elements to rational ones is provided by the phases in the life of a couple – going from the young couple to the family with children through to old age when the nest is empty – which influence consumer and saving patterns (Modigliani, 1966). Expectations play a significant role in this interpretive model, too. Therefore, consumption is not correlated exclusively or prevalently to the income available at a given time. According to Modigliani's hypothesis, the reference should instead be extended to all the resources that have been available until now and to all those expected in future (life resources). The quality of the future takes shape not only on the basis of career and income prospects but also on the basis of general life prospects. In any case, the capacity to elaborate such a vast horizon spanning past and future is yet again a hypothetical, unrealistic and, therefore, utopian attribute.
It would be better if we were to go back to the concatenation between factors that are rational and factors that are not, in both the individual and the collective elaboration. The former has to do with personality traits, draws on acquired culture and is influenced by the media. The latter is the sum of individual findings and can be observed through social analyses and *ad hoc* research.

2. CONSUMER SENTIMENT INDICES: DO THEY CORRESPOND TO WHAT THEY PROMISE?

Everyone uses the term *«sentiment»*, but it is a word that has no equivalent outside the framework of Anglo-Saxon linguistic culture. The term is anything but unequivocal. The Concise Oxford Dictionary specifies that it is *«the sum of what one feels on some subject, a tendency or view based or coloured with emotions»*, which can be summed up as *«what I think about…»*. In Italian we find: *«stato d'animo»* (mood), *«opinione»* (opinion) or *«parere»* (view); but the most appropriate Italian terms in the context of the indices could be: *«stato d'animo»* (mood), *«umore»* (humour) or the widely used *«fiducia»* (confidence).
Provided in the paragraphs that follow are: an illustration of the available indices in Italy and abroad; the limits, with a critical review, of the questionnaires and of sampling themes; and, finally, proposals with respect to supplementing the indices with elements not included in standard models and the probabilities of accurate samplings.

Immediately after the second world war, such a requirement did in fact emerge in the United States. In spite of the fact that sentiment indices have been carried out without interruption until the present day, they have only really received attention in periods of shock. What is more, as the years have passed modern technologies have increasingly facilitated the interaction between individuals and groups. Communication is now both widespread and immediate; facts and opinions are available on the web, with debates and comparisons. Sample research makes it possible to monitor the attitudes of political leaders, government initiatives and reactions of households to all sorts of events. The perception of rising taxes and prices anticipates defensive

behaviors, which are reflected in initiatives adopted by producers and mass distribution. Sentiment therefore has an important role to play.
But what, really, is this amalgam of reactions to media stimuli and to the perception of the social areas of interest? From their very origin, sentiment indices have been a sum of *«balances»* between positive and negative affirmations in relation to a limited set of questions put to a sample of citizens. But, even though I have conducted each of my research projects with the utmost care, consulting a broad international bibliography, the object of the assessments has never been conceptualised. This does not necessarily constitute a serious *vulnus*. But it is a fact. Therefore, it should be stressed that we will be following a pragmatic and operational approach. There is nothing unusual in this, however, as we will see in the paragraph that follows.
Various problems will emerge in pragmatic applications:

- we need to update the indices, given that the determinants of mood or confidence are not the same as they were 68 years ago;
- is the difference between positive and negative responses the best solution?
- do the items forming the indices all have the same importance or can/must they be considered differently and hence weighted, in the wake of statistical analyses such as that of the principal components?
- given that further in-depth analyses into micro-data signal obvious differences in findings within aggregate samples between genders, age classes and social and economic characteristics, it will be advisable to reinforce the size of the samples and provide elements for subsamples, as well;
- the choice of the telephone method of sampling has never provided an *«optimal coverage»*. Today, in Italy and in developed nations, this method ought to be dispensed with in favour of a sample of areas, for example. In our country, this possibility is provided by the availability of over 402,000 micro-areas singled out by the ISTAT in 2010-2011 for the recent population census.

3. SENTIMENT: AN OPERATIONAL DEFINITION

As mentioned above, sentiment or confidence indicators are not the product of an original scenario providing a definition of contents[2]. In any case we are dealing here with a multi-dimensional concept, which sets out to understand the mood arising from the situation of interest and from expectations for our reference frameworks, possibly as a leading indicator of purchasing behaviours. The sequence of findings provided by the sentiment index should express the *climate* of the country, from the consumer's angle, and also – after extending the area targeted – from the angle of other operators. Currently, in Italy, insofar as it is an indicator of confidence, the Index of Consumer Sentiment – ICS can, with caution, be attributed to the strategic orientations of consumers (Bosio et al., 2005).
It should be stressed, therefore, that what we are dealing with here is a *«statistic»* characterised by the items which collectively identify it. There is nothing unusual in such a situation.

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

The construction of summary indicators, especially social indicators, contemplates an operational pathway, with the following characteristics (Aureli Cutillo, 2002: 135):

a) in view of the fact that the complex phenomena are neither unequivocally definable nor exhaustively attributable to a set of simple indicators, the findings obtained are influenced by all the simple variables utilised;
b) on the basis of a set of initial variables, the findings obtained are influenced by the criteria by which the information used is summarised;
c) given all the simple variables selected, and once the criteria by which they are summarised have been defined, the findings obtained are nonetheless only an *«indicator»* of the complex phenomenon under survey, and not a *«measure»* thereof.

The Joint Research Centre (European Commission) indicates 10 steps for constructing complex indicators. A specific *«step»* is reserved for the analysis of sensitivity in relation to the elimination of one or more simple variables from the complex indicator, thereby implicitly acknowledging that the initial definitions are neither stable nor unequivocal.
The CNEL-ISTAT Committee has developed a *«definition»* of the prosperity of Italian society broken down into 12 domains encompassing 132 indicators. These include the subjective assessment of economic difficulty, the perception of occupational insecurity, an indicator of social participation, confidence (in parties, local institutions, etc.) (CNEL-ISTAT, 2013). It is clear that the exclusion of some variables and the methodological choices of aggregation will influence the results.
In a quite different context, an operational or pragmatic definition is associated with temperature. Temperature is a physical property inherent in the notion generally expressed as the alternative between hot and cold: this aspect is quantified, or measured, by using the thermometer, which can be calibrated to different scales.

4. THE INDEX OF THE UNIVERSITY OF MICHIGAN

Ultimately, the index of sentiment is an operational result which sets out to comprehend sentiments expressed dynamically – in terms of positive or negative variations – in reaction to a set of items. Such *«moods»* or states of mind are thought to have an impact on behaviours in such areas as spending, saving and financial investments. They thus provide an idea of the degree of confidence in the present based on developments in the recent past and on future short to medium term expectations. Otherwise, symmetrically, the degree of confidence could be determined from the future that we expect bearing in mind the present that has evolved from the recent past.
How is it that we have come to attribute a driving role in economic behaviours to the balance between optimism/pessimism as far as our personal economic conditions, or those of our country, are concerned?

Psychology-driven consumer models were fertilised in the United States under the stimulus of a small group of scholars who emigrated from Austria and Germany in the 1930s.
In 1937, Ernst Dichter, then aged thirty, arrived from Vienna. Today, he is seen as the *«father»* of qualitative research with applications of psychoanalytical theory to all sorts of products (including politicians and parties). Since then, motivational research has evolved, incorporating

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doctrinaire references from semiotics, from the theory of affective codes, from transactional analysis, etc. (Marbach, 2014).
An important role in adjacent areas was assumed by two other scholars.
Paul Lazarsfeld had worked at the Institute of Psychology of the University of Vienna until 1933. Aged just 32, he moved to the United States, where he was to become a professor of sociology at Columbia University. He has the enormous merit of having associated qualitative and quantitative methods. He conceived the panel, the aim of which was to monitor changes in voting patterns in the course of the final phases of an election campaign.
Georg Katona, who was the same age as Lazarsfeld, was Hungarian by birth and moved to Germany at the age of 18. He obtained a Ph.D. in experimental psychology at the University of Göttingen; he was a supporter of the *Gestalt* theory. He, too, emigrated to the United States in 1933, and after the world war he worked as a director at the Survey Research Center of the University of Michigan. He underscored the role of perception in consumption: he distinguished the role of expectations and of confidence, affirming that the consumer does not follow a rational programme and is influenced by a variety of changeable factors.
G. Katona (1964: 25) points to the need to *«study subjective variables in order to understand economic processes»* and, in so doing, he also singles out J. M. Keynes on the analysis of subjective factors capable of influencing saving. He affirms that *«the most important method of research in economic psychology is provided by sample surveys based on interviews»* (Katona, 1964: 504). Ultimately, he set out to associate principles of psychology to macroeconomics. In his research he registered an enthusiastic and positive attitude in the United States population in the post-war period, on the basis of which he predicted a boom. There was indeed a boom, at a time when conventional econometric indicators had instead oriented themselves toward a recessive trend.
In the mid 1940s, the Federal Reserve entrusted the workgroup headed by Katona with a Project. It took shape in 1946, in the form of a monthly sample phone survey, which utilised a questionnaire consisting of five items: the findings, in terms of differences between positive and negative answers, were condensed in an index known as the Index of Consumer Sentiment, abbreviated to ICS.
The objectives pursued were to:

- observe short term attitudes of consumers in relation to the business *climate*, to their personal financial situation and to their purchases;
- obtain empirical measurements of the consumer's expectations, to be included in economic behaviour models; and
- measure the levels of optimism versus pessimism of consumers.

The creation of the ICS was attributed to the director, but he never claimed its authorship. In Katona's main books there is never any mention of the ICS. But that is not all: there is no document whatsoever referring to the adopted criteria or to the selection of the five items. Furthermore, it is curious that the phone sample was adopted – for a very poor sample size - when the *«coverage»* obtained was rather partial and selective. There is no technical appendix on this point, either, and this is even more curious if we consider that it would have been possible to consult L. Kish, another immigrant from Hungary, and one of the most eminent experts in statistical sampling.

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

The ICS was active during a period of social turbulence, with strikes in 1946 that led to the loss of 116 million man-days (Patterson, 1996: 43,62). I am perplexed by the selected survey method, given that, in the second half of the 1940s, 30% of United States citizens were poor, based on the standards of the time, and could certainly not be reached by phone.
Consequently, the hypothesis that the project was implemented thanks to the financing made available by the Federal Reserve cannot be ruled out. This solution of the *«mystery»* is corroborated by the contents of a book written by Katona and Müller (1956).
The book looks into an experimental index of changes in *«Consumer Attitudes»*, which wield a significant influence over propensities to make purchases (Katona & Müller, 1956: 91). The two authors utilise questionnaires, in which they pose questions with three alternative responses: positive position, negative position or an indication of uncertainty/no change. They are oriented toward considering only the first two categories of response, but they are well aware of the fact that the third category is not irrelevant. Indeed, *«according to some experience»* (Katona & Müller, 1956: 93) neutral positions, in terms of their effects, would appear to be akin to pessimistic positions. But they provide no indication either of the experiments conducted in this respect or indeed of the measured effects, presumably on purchases of specific categories of products. But the caution shown with regard to the fact that neutral reactions are not included in the calculations implicitly points to the need for in-depth analyses. Such analyses are also, and above all, desirable in times of difficulty such as those we are going through now.
Finally, Katona and Müller (1956) present their observation model, which is as follows:

1. **Personal financial situation** (economic situation applying to you and your family in the Italian version)
   - better or worse than a year ago
   - expected to be better or worse in a year
2. **Conditions of business** (Italian economy in the version used in our country)
   - better or worse in the course of the next year
   - better or worse in the next five years (in the Italian version the wording is more analytical)
3. **Market conditions**
   - This is a good time or a bad time for purchasing domestic goods
   - Price expectations for the coming year
4. **Purchasing intentions**
   - new cars in the course of the next twelve months
   - an apartment for personal use in the course of the next twelve months

The box separates – as not included in ICS by the University of Michigan Workgroup – expectations of changes in prices and intentions to purchase new cars and apartments for personal use.
On carefully scrutinising the findings of their work, Katona and Müller show that they are aware of the possibility of introducing a weighting for indications *«which are salient to respondents»* (1956: 96). Today, this re-elaboration would be facilitated by the availability of statistical techniques enhanced by software application packages. In view of the difficulty of establishing a

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system of weighting, which would then have required a lengthy study, a great deal of time and difficult calculation problems, the two scholars adopted equal weights *«as a temporary solution»* (Katona & Müller, 1956: 97). But they warn that, in particular periods, some of the questions may have a particularly significant influence on the propensity to make purchases. They therefore lean toward a periodical overhaul of the Index.
The sample utilised is probabilistic, in such a way as to facilitate estimates characterised by confidence intervals. The size of the research, which is presumably done semi-annually, is approximately 2,000 personal interviews, with the sampling being split into several groups. As one would expect, the analyses based on sub-samples highlight the influence of family income and age (with greater pessimism in interviewees aged over 65). But no provision is made for a structure standardisation based on official demographic and economic data pertaining to households.
Ultimately, the *«life»* of the ICS has followed distinctly different itineraries to those of Katona's studies. But the sentiment index, in the abridged version compared to that of the Director of the Research Institute where it came to life, has been a huge success. It has spread from the United States to Canada, Australia and the main countries of Europe and Asia.
An illustration is provided below of the Italian versions and the versions of international research, followed by critical comments and suggestions.

5. SENTIMENT INDICES IN ITALY AND IN OTHER COUNTRIES

In our country we have sample surveys inspired by the ICS or, more simply, oriented toward the juxtaposition between optimism and pessimism.
A light version is adopted in the Censis-Confcommercio semi-annual survey launched in January 2009. Samples of approximately 1,200 breadwinners interviewed by phone using the CATI method are asked the question *«How do you see the future for yourself and your family in the coming months?»*, with the following response modalities:

- I am optimistic (I see the future with confidence, security and satisfaction)
- I am pessimistic (I see the future with fear, anxiety, concern and frustration)
- I don't know, I'm not sure

For over ten years the GfK Eurisko Institute has been conducting a sample survey by phone using the CATI method, targeting 1,000 adults every month. The questionnaire draws inspiration directly from the ICS of the University of Michigan, as we can see in the questionnaire reproduced below.

1. *Please tell me whether you (your family) are better or worse off financially compared to a year ago?*

   Better, Same, Worse, No indication

2. *In a year's time do you think you and your family will be financially better or worse off than today?*

   Better, Same, Worse, No indication

3. *Generally speaking, do you think that in the next 12 months things will go well, so-so or badly for the Italian economy?*

   Well, So-so, Badly, No indication

4. *Looking to the future, what do you think will happen in Italy in the next 5 years? Do you think that …*

   We will have a period of ongoing prosperity

   Things will be the same as now

   Unemployment and the economic crisis will increase

   No indication

5. *Considering the most expensive goods people purchase for the home, such as furniture, furnishings, refrigerator, house, television, etc., do you think that this is a favourable or an unfavourable time to buy?*

   Favourable, So-so, Unfavourable, No indication

In its turn, the ISTAT is continuing the monthly surveys which were conducted by the ISAE from 1982 until December 2010. The climate of confidence is singled out on the basis of a number of additions compared to the orthodox ICS, namely: an assessment of Italy's economic situation; opportunities to save; whether or not respondents have managed to save in the last 12 months. The findings are seasonally adjusted[3].

In 2005, the Nielsen group launched a project which in part draws inspiration from the ICS, but which is also significantly different to it. What is more, in one of the 56 countries where the initiative is being developed, the University of Michigan is involved. I refer to the Nielsen Global Survey, which incorporates a Consumer Confidence Index – CCI.
The survey is conducted prevalently every four months on adult consumers who surf the Internet. The interview should take 20 minutes to be completed. The questions cover a wide range of topics, including:

- Saving
- Important current expenditure
- Important expenditure expected in the next 12 months
- Price trends over the last twelve months
- Price trends in the next 12 months
- Intentions to buy a car in the next 12 months
- Intentions to buy a flat in the next 12 months
- Employment prospects in the next 12 months
- Personal finances in the next 12 months
- Whether this is the right time to buy what we need and want

The project also envisages, every six months, a number of in-depth analyses and, above all, an analysis into how recession is perceived[4]. The responses are graded according to four

progressing modalities: excellent, good, not so good, bad. The responses are classified on the basis of a scale of 200-133–67-0. For reasons warranting examination, Nielsen's researchers have evidently selected an interval of 0-200. Therefore, after pre-establishing three equidistant intervals within it, it follows that each one is equal to 66.6; at this point the scale is determined. However, the hypothesis of constant intervals may not be correct, in view of the verbal tags selected.
The presumption of equidistance between numeric values arbitrarily associated to the response labels does not rest on empirical foundations. It would have to be demonstrated that *«excellent»* is as far from *«good»* as *«good»* is from *«not so good»* or another in sequence; and so on. These are dummy hypotheses ascribed to any object of valuation modulated between opposite poles. As mentioned above, specific problems emerge in the sequence of the verbal tags utilised by the Nielsen Group: the extremely positive *«excellent»* is in juxtaposition to *«bad»* and not *«very bad»*; *«not so good»* also jars somewhat (see the Schedule), given that it is not rebalanced by a more suitable *«not so bad»*.
Focused sample surveys also show us: the influence of different techniques of interviewing; the role played by the extension of the selected scale; and the irrelevance of the arithmetic mean in all the situations (Marbach, 2004).
The last three topics on the above list form the summary basis of the CCI in each country. For all nations, the sample size is always in the region of 500, although there is a limited exception for the United States (550).
In one big country, we find a different approach. The China Consumer Confidence Index is produced in collaboration with the director of the survey on Consumer Sentiment at the Social Research Institute of the University of Michigan. The index is obtained monthly through a stratified random sample of 1,500 households, in 50 cities. The data are collected through CATI; the April 2007=100 finding is adopted as the basis. Perplexities arise immediately with regard to the use of phone interviews and the very small size of the sample in such an enormous country.
Nielsen is fully aware of the particular characteristics of the selected methodology, which only considers adult consumers available online. They *«tend to be early adopters… because of their relative affluence… For low-penetration countries the online population tends to be skewed towards younger people, males, higher incomes… and people living in metropolitan areas»*. These observations ought to be of particular relevance to: India (with a penetration of 10%), South Africa (14%) and Indonesia (16%).

It should be considered that in Italy – as of June 2012 – of all persons aged over 14, 5% use the Internet every week. In the 55-64 age range, 35% do so. If we consider persons aged over 54, this figure falls to 20%[5].
In situations of widespread turbulence and negativity, the indicators inexorably express an increasing lack of confidence, which coincides roughly with the periods concerned.
Some analytical studies then add cognitive elements, which are useful when it comes to interpreting the findings more thoroughly.
The purchasing habits of households had not yet changed in the course of the 2008-2009 period[6]. In spite of this, the presence of a declining level of confidence could already be observed. Initially, though, changes in consolidated behaviours tend to be rather viscous.
The composite index of perception of the general situation and hence of people's mood in the social and economic context – the ICS – is influenced by numerous factors, as we mentioned earlier. If these factors were to act without there being an element prevailing specifically over

the others, sentiment could be interrelated with consumption, either contemporaneously or as a leading indicator. But some analysis have instead stressed that the price factor has acquired a predominant role in orienting both confidence and consumption[7]. Consequently, any statistical relationship in this respect would be spurious. It is significant that, immediately after the onset of the crisis, in the autumn of 2008 the Italian economy registered: a reduction in mortgage rates, a reduction in the prices of raw materials producing effects on the price of petrol, and an intensification of promotional activities on the part of many companies which had the ability to move swiftly to contain the effects of the imminent economic crisis. These components gave rise to a surge of positivity, which was obviously paradoxical if we consider the events that unfolded at that time and indeed later.
Another curious characteristic of the trend of the ICS manifests itself after political elections, no matter who wins them. Sometimes this also occurs shortly before people go to the polls. The sentiment of United States consumers is very often the most optimistic indicator one month before the new president is chosen: in mid-October 2012 it reached its highest point since September 2007. The index in any case registers an upswing, which points to the fact that, by nature, the human soul prefers optimism: we would like to believe that something different may/should contribute towards giving us greater prosperity.

6. THE CONFIDENCE INDICES OF COMPANIES IN ITALY

In the wake of sentiment indicators for households, the same criteria have been applied to companies, by extension as it were. The request for assessments on the part of those providing information clearly hinges on more substantial elements of knowledge than recent trends and prospects: senior managers and entrepreneurs are well aware of the situation of the market and the company; in turbulent phases, above all, they scrutinize opportunities and possible risks for domestic demand and for demand in equivalent sectors abroad. The model of observation is sometimes borrowed from that of the orthodox ICS[8].
In some cases, the approach follows a more pragmatic course (ISTAT). The questions thus cover a variety of aspects, such as: turnover, orders, cost of labour, liquidity, sale prices, export strategies and inhibiting factors, and access to credit.
In Italy, the GfK Eurisko Institute adopts the classic criterion for a survey - conducted quarterly since March 2004 - on corporate sentiment. The survey examines companies which have more than 200 employees and which operate mainly in the communications sector in the broad sense of the term. The questionnaire is supplied online and in each cycle there are approximately 800 respondents. Clearly, the information obtained does not reflect a true statistical sampling reality, but it provides elements for reflection on companies that are of interest for communication and marketing research.
Unioncamere deals with the national segment of an annual survey coordinated by Eurochambres, based on the observation model indicated in endnote 8 and on a concise questioning on *«business confidence»*. This initiative, which covers numerous areas of Europe, was launched in the mid-eighties. The sample is taken from the Companies Register, the INPS Register and the INAIL Register; 1,500 respondents are interviewed by phone using the CATI method, which in the case of companies does not introduce distortions. The findings are weighted according to the number of employees.

The findings of the survey show, *inter alia*, that as far back as June 2008 entrepreneurs in Italy already had the perception of an economic crisis that was to continue in the years to follow. Nonetheless they showed a constructive spirit, understanding the need to concentrate on product and process innovation. But in the 2008 and 2009 observations, the Unioncamere survey shows a curious overvaluation of the subjective capacity to compete. This sensation of overconfidence is ascribable to an inadequate diagnosis of what was a dynamically problematic situation, after the 2008 watershed. Cognitive errors follow from this. In short, it emerges that situations of significant negative change may give rise to a mechanism of resistance, which is translated into a positive assessment of one's results which is detached from reality. This mechanism persists for a while at least, until it is overwhelmed by the reality of the situation; it acts as a brake on flexibility initiatives. Consequently, it is dangerously misleading.
As explained above, the ISTAT is continuing the surveys conducted by the ISAE. The sample is made up as follows: 4,000 manufacturing firms, 700 construction firms, 2000 firms operating in market services and 1,000 firms operating in retail trade. The findings are weighted according to the number of employees.
This survey envisages questions on: (high, normal, low) levels of orders, demand from abroad and internally, production, inventories (higher than normal, normal, lower than normal, no stocks), liquidity, and the percentage variation in the cost of labour over the last 12 months; furthermore, for the same variables: the trend in the next 3 months (increase, stationary, decrease) of overall employment envisaged in the company, conditions of access to credit compared to 3 months earlier (more favourable, constant, less favourable). It winds up with an analytical section on export strategies and factors of hindrance.
The pointers obtained and summarised are semantically assimilated to the confidence climate expressed by consumers. The samples are taken from the statistical archive of active companies (ASIA), excluding smaller companies; the surveys are carried out by phone, using the CATI method. In this case, as with the Unioncamere survey, the selected method provides a comprehensive coverage of companies, without giving rise to distortions. The findings, seasonally adjusted, are available separately for the four sectors of activity and included in the Istat Economic Sentiment Indicator-IESI.

7. THE ICS UNDER SCRUTINY

As we have seen, the index of the University of Michigan draws inspiration from the first five items of G. Katona questionnaire, which, however, also included price expectations for the coming year and intentions to purchase (a car or an apartment for personal use). There is no justification for this exclusion in the literature at our disposal. The ICS has however remained unaltered in its structure for 68 years until now, as though the factors determining the attitude of consumers in the numerous areas of the world where it is applied are constant. Such a hypothesis is clearly audacious when we have widely differing economies, evolving demographic and social relations, innovative roles of ethnic groups, and ever increasing interrelations in communication.
In the studies he conducted in the 1950s, Katona himself stresses a number of points warranting further analysis: the undifferentiated weight attached to the items is provisional; the role of the drivers needs to be studied and further clarified; the +/- balance, which neglects neutral responses, is a procedure susceptible to change, if and when we arrive at a more satisfactory definition of neutral responses, which, in some cases, it would be better to attribute to

pessimistic orientations. But the nebulous concept underlying the ICS could itself be specified, given that the index performs better, from a predictive angle, in phases of turbulence than in *«normal»* phases.
This aspect has been called into question within the University of Michigan itself. R. Curtin, director of consumer surveys, writes:

> *«It should be no surprise that the definition of consumer confidence has remained elusive…it is only the behaviour of consumers that can be observed. Katona originally considered consumer confidence to be a broad measure of expected changes in income…(he) defined the dimension of consumer confidence as ranging from optimism and confidence to pessimism and uncertainty»* (Curtin, 2002: 2).

In this perspective Katona referred to consumer sentiment. In any case, Curtin (2002: 7) considers that the underlying theory should be specified.
But if the ICS is vested with a purely operational and pragmatic role, what are the effects of this role? In some circumstances it has been a good predictor of the gross national product in the United States (Howrey, 2001). But the focus is provided by personal consumer spending: in this respect, at the University of Michigan they have ascertained that unemployment expectations are a significant predictor. The result is not unusual; but consequences have not been drawn from it as far as the role of the ICS and its structure are concerned.
The characteristics of the economic and social situation have differing effects on the mood of citizens (and of economic operators). Negative developments have a considerably stronger negative impact on consumer feeling and opinions than positive changes of the same value (Drozdowicz-Biec, 2012). Besides, Katona (1977) was himself aware that the interpretive capacity of a sentiment index is greater in periods of shock.
Although a variable and limited credibility can be ascribed to the ICS when considered on its own, its validity is augmented in conjunction with other variables included in a model. In particular, economic predictions made on the eve, or at the onset, of a shock draw benefit from the ICS being included.
The empirical verification emerges in projections carried out in the USA in August 1990: whereas no econometric model had been able to predict the sharp decline of consumer spending that was registered at the end of the year, the model that included the ICS came closer to the mark (Garner, 1991). Considered on their own, sentiment or confidence indices are not reliable predictors of purchases of durable goods under *«normal»* circumstances; but they can be useful in exceptional instances where confidence changes abruptly. This affirmation is confirmed by analyses conducted in the United States, which have highlighted behaviours of the ICS in the presence of economic and political stress, *«particularly at turning points»* (Throop, 1992: 38).
The analysis of the controversial capacity of the ICS to anticipate consumer behaviour has also been addressed in relation to various national realities (Golinelli & Parigi, 2004). The behaviour of households and their psychological particularities may differ in terms of: the current competitive framework, the structure of the labour market, the current system of welfare and the strength of political and economic institutions, whilst neglecting cultural factors for reasons of brevity. It is no coincidence that links have been noticed between the ICS and variables such as the rate of unemployment and inflation, which could together represent a Discomfort Index (Lovell & Tien, 2000).
Golinelli and Parigi (2004) have examined the thirty-year period from the first four months of 1970 through to the same period in 2002, for eight countries: Australia, Canada, France,

Germany, Italy, the United Kingdom, Japan and the United States. The variables utilized were: the four-monthly growth rate in the gross national product; inflation; unemployment with supplemental analyses for the difficult years from 1971 to 1980. Analyses based on sub-periods covered the Reagan era (1980-88), the Bush era (1989-92) and the Clinton era (1993-2001) for the United States, Canada, Australia and Japan. Analyses based on sub-periods were also conducted in the other four countries.
In France and Germany, the Economic Discomfort Index emerged as the main interpretive variable of consumer sentiment in the years going from 1991 to 2002. In the same period, the Japanese CSI is significantly correlated to the unemployment rate.
The authors conclude that there is no evidence to support the hypothesis that there is a single model valid for all countries (Golinelli & Parigi, 2004: 157).
Ultimately, the confidence indices are influenced by a variety of factors which change in time and which are not the same for different countries. More specifically, in situations where the debate on matters such as the public debt and welfare reform is high on the agenda, this bears on the confidence indicator for households. Such evidence will have to be further analysed in the framework of the turbulent years of recession starting in 2007-2008.

At this point, we can move on to analyse the deficiencies in observation.
As mentioned above, the 1946 launching of the ICS in the United States in the form of a phone survey on just 500 persons is unusual. Then, as indeed in the years that followed, the University of Michigan researchers eliminated the knowledge of bias of the interviewees thus selected in relation to the population as a whole. In other surveys on the same topics, G. Katona used national samples of 2,000 adults interviewed directly. The inconsistency is once again ascribed to the presumed need to use carefully the financial resources made available by the sponsor, without directly involving Katona, who – it should be stressed – has never claimed the authorship of the ICS. It should also be considered that the first findings of the index of the University of Michigan start out in a turbulent context characterised by a bitter confrontation between unions and management: in 1946, 116 million man-days of work were lost (Patterson, 1996: 43). The influence of employment on the sentiment indicator is not considered in the ICS, though. Moreover, as mentioned above, the bias inherent in the phone sampling could not have passed unnoticed in the working group, which knew that in United States society in the second half of the 1940s poverty – based on the standards in force at the time – had spread to 30% of the population (Patterson, 1996: 62).
A number of comments emerge in literature in spite of the silence of the scientific community with regard to the bias produced in the results by the sample typology, but the comments do not address the coming technical conclusion. It has emerged in the United States ICS (Bryan & Venkatu, 2001) that: middle-aged respondents with high incomes have a better vision than low income earners, youngsters, elderly persons and those less educated, who also have difficulty in predicting the inflation rate; those who can rely upon a higher-than-average income tend to underestimate inflation. But no comparison is made between the composition of the ICS sample in terms of age, gender, level of education and income, and that of United States households as indicated in official statistics. Such comparisons should have been carried out periodically, in such a way as to be sure that the monthly samples conform to the structural reference characteristics.
It should also be remembered that the *«coverage»* provided by phone samples has never been all that good, and in recent years it has diminished even further. In the United States particular

segments of citizens shirk the interview, as this is true everywhere; furthermore, there is a high proportion of *«unlisted numbers»*, especially in metropolitan areas. In this respect, no relief is provided by the recourse to phone numbers generated at random - as in the Random Digit Dial Telephone Survey of Households in the Contiguous United States - to the need for a sample of responses expressing a *«photograph»* proportionately reflecting all reference households.

We will now move on to Italy. The most recent available data – which refer to 2013, ISTAT Multipurpose Survey – provide the following picture:

Households	***Millions***	***%***
Altogether	25.0	100.0
With a landline phone	16.3	65.2
Unlisted users	*4.5*	*18.0*
Reachable by file	*11.8*	***47.2***
With only a mobile phone	8.3	33.2
With neither landline nor mobile	0.4	1.6

It should be noted that less than fifty per cent of Italian households can be reached through samples taken from phone subscriber directories.
As many as 28% of landline phone subscribers have the availability of a non-accessible (*«unlisted»*) phone number, which means 18% of households. This corresponds to over 4 million people, who are mainly concentrated in Lombardy and in Lazio. In this broad segment, people read more books, watch less television every day and use the personal computer much more.
Those who only use the mobile phone have in their turn traits which cannot be superimposed onto interviewees that can be reached using the CATI method. In this segment, the following categories have a greater incidence: singles, couples with no children, youngsters aged 25-34, and so-called *«shock workers»* of the GFK Eurisko typology[9].
Persons excluded from any form of telephony reside above all in small municipalities; they are single but no longer young, have little education and are characterised by marginal lifestyles.
Ultimately, the percentage of Italian households that can be interviewed through phone surveys continues to fall and will soon be less than 45%. The samples thus obtained fail to reproduce the national breakdown.
A satisfactory solution could be provided by the 402,232 micro-areas of the census. These areas, which have been identified within the territory and geographically codified, can be characterised on the basis of social and demographic profiles. A stratified sampling of these areas will make it possible to select a limited number of them; within each area a representation of all household typologies will be available.

8. A RESHAPE IS NEEDED

Ultimately, it is a matter of constructing one or more composite variables that are an expression of the *«sentiment»* of operators in whose action we are interested. To this end, it will be necessary to activate a specific project, built on the ruins of the ICS, with some initial constraints:

- The prepared indices cannot apply to all nations and for an indefinite number of years. We need to firmly combat the propensity to consider research instruments to be *«universally»* applicable because they can only be relative. The question goes beyond purely technical aspects, in that at a more general level it has to do with the very manner in which we conceive the epistemological foundation of human sciences. The drivers will be identified on the basis of precise territorial references, and it will in any case first be necessary to overhaul the items and main factors in the form of periodical checks. Such checks are vital – for instance – during the crises which have been present since 2008;
- In the exploratory phase it is necessary to examine a large number of aspects, singled out, where appropriate, through qualitative surveys and contributions provided by privileged witnesses; any aspects not coming within previously activated survey practices will be periodically observed *ad hoc*;
- From the initial wide range of components, there will be a reduction to components of particular relevance through the application of appropriate available techniques;
- Account will be taken of specific phases of uncertainty brought about by calamitous events (earthquakes, floods, etc.), political events, war, terrorist acts and suchlike;
- Work will proceed on the basis of suitable sampling approaches, to the extent permitted by the availability of statistical sources in the various countries. Moreover, the samples, which will follow one another at close intervals, will be correlated to the social and demographic breakdown consistent with official statistics.

As time has passed, consumer confidence indicators have acquired an increasingly important role. On a number of recent occasions, for example, a fairly positive sentiment figure expressed by German companies has contributed towards an upturn in European stock exchanges. Therefore, it is ever more necessary for the ICS, in its various versions, to be technically accurate and hence reliable.
In this respect, we have to stress the advisability of using samples that apply to the entire national population of adults, samples characterised by effective randomness. The indication of confidence intervals will follow from this. The need for findings accompanied by indications of differences that are, or are not, of significance in subsequent phases of the survey will require adequate sampling sizes. In any case, the dissemination of the findings will necessarily have to become coherent and statistically orthodox.
Spatial comparisons should be carried out in the framework of clusters of countries, especially as far as the drivers characterising the indices are concerned. Geographical proximity ought not to be a constraint.

Finally, I have received a general comment from the famous Italian sociologist Giuseppe de Rita concerning a previous draft of this paper. A wide range of persons and entities are involved in the *«climate»* that develops between optimism and pessimism: consumers, companies, financial

players, local authorities, etc. Due account will have to be taken of these interrelations and of the various protagonists on clarifying the influence produced on anxieties and juxtaposed reassurances.

9. SCHEDULE

Topics covered by the Nielsen Global Survey. Only questions Q3 – Q4 – Q5 constitute the Consumer Confidence Index.

Q3. Do you think job prospects in your country over the next 12 months will be:
Excellent
Good
Not so good
Bad
Don't know

Q4. Do you think the state of your own personal finances in the next 12 months will be
Excellent
Good
Not so good
Bad
Don't know

Q5. Considering the cost of things today and your own personal finances, would you say at this moment the time to buy the things you want and need
Excellent
Good
Not so good
Bad
Don't know

Q6. Once you have covered your essential living expenses, which of the following statements best describes what you do with your spare cash: I spend on
Out-of-home entertainment
New clothes
New technology products
Holidays / vacations
Paying off debts/credit cards/loans
Putting into savings
Investing in shares of stock/mutual funds
Retirement fund
I have no spare cash
Don’t know/undecided

Q7a. What is your biggest concern over the next six months?
Job security
Terrorism
The economy

War
Global warming
Immigration
Crime
Health
Political stability
Work/life balance
Childrens' education and/or welfare
Parents' welfare and happiness
Debt
Tolerance towards different religions
Tolerance towards other countries' values
Lack of understanding of other cultures
Increasing food prices
Increasing utility bills (electricity, gas, heating, etc)
Increasing fuel prices
Other concern
No concerns

Q7b. What is your second biggest concern over the next six months?

Job security
Terrorism
The economy
War
Global warming
Immigration
Crime
Health
Political stability
Work/life balance
Childrens' education and/or welfare
Parents' welfare and happiness
Debt
Tolerance towards different religions
Tolerance towards other countries' values
Lack of understanding of other cultures
Increasing food prices
Increasing utility bills (electricity, gas, heating, etc)
Increasing fuel prices
Other concern
No concerns

Q8. Do you think your country is in an economic recession at the moment?

Yes
No

Q9. Do you think your country will be out of an economic recession in the next 12 months?

Yes
No
Don't Know

Q10. Compared to this time last year, have you changed your spending to save on household expenses

Yes
No

Q11. Compared to this time last year, which of the following actions have you taken in order to save on household expenses?

Use my car less often
Cut down on at-home entertainment
Cut down on out-of-home entertainment
Cut down on take-away meals
Cut down on smoking
Spend less on new clothes
Switch to cheaper grocery brands
Cut down on telephone expenses
Try to save on gas and electricity
Cut down on holidays/short breaks
Cut out annual vacation
Cut down on or buy cheaper brands of alcohol
Look for better deals on home loans, insurance, credit cards etc
Delay the replacement of major household items
Delay upgrading technology, e.g. PC, Mobile etc
I have taken other actions not listed above

Q12. When economic conditions do not improve, which of these do you expect you will continue to do?

Use my car less often
Cut down on at-home entertainment
Cut down on out-of-home entertainment
Cut down on take-away meals
Cut down on smoking
Spend less on new clothes
Switch to cheaper grocery brands
Cut down on telephone expenses
Try to save on gas and electricity
Cut down on holidays/short breaks
Cut out annual vacation
Cut down on or buy cheaper brands of alcohol
Look for better deals on home loans, insurance, credit cards etc
Delay the replacement of major household items
Delay upgrading technology, e.g. PC, Mobile etc
Other actions not listed above
None

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ENDNOTES

[1] See the collection of the most representative papers of J. STIGLITZ, *Informazione, economia pubblica e macroeconomia*, Ed. Il Mulino, Bologna 2002.

[2] We can here quote the well known affirmation *«So what is time? If no-one asks me I don't know; If I wished to explain to the person who asks me I don't know. But this I can confidently say I know: if nothing passes there would not be a past time; if there is nothing to come there would not be a future time; if there is nothing that exists there would be no present time»*, AGOSTINO di Ippona, *Vita, pensiero, opere scelte,* Il Sole 24 Ore S.p.A., Milan 2006, p.338.

[3] The other aspects of the ISTAT survey are: two-stage sampling design, with a systematic random selection in the first stage and quotas in the second; size 1,200 interviewees using the CATI method.

[4] All the questions selected for the Nielsen Global Survey are set out in the Schedule.

[5] Data taken from the periodical survey *Sinottica*: see E. LUCCHI, *Il Digital Device dei Senior*, Eurisko Social Trends, Nov. 2012, no. 116, pp. 34-41.

[6] Sample survey carried out by the Unioncamere Centre of Studies in January 2009; see Unioncamere, *La crisi globale, la ripresa locale*, Rome, July 2009, p.79 et seq.

[7] This evidence has been passed on and proven to me by Mr. Silvio Siliprandi, CEO of GfK Eurisko srl.

[8] The main questions are transformed in the following terms:

1. Is your company's business better or worse than a year ago?

2. In a year's time do you think that your company will do better or worse than today?

3. Altogether, do you think that for companies operating in Italy things will go better, so-so or badly in the next 12 months?

4. Looking to the future, what do you think may happen to companies operating in Italy in the next 5 years? Do you think that: 1) we will have a period of ongoing prosperity? 2) Things will remain as they are now? 3) there will be an increase in unemployment and in the economic crisis?

5. Considering investments made in order to develop companies, do you think that this is a favourable or unfavourable time to make investments for a company?

[9] This is a male segment, efficiently described by the words «anything for success», measured above all through money.

www.business-systems-review.org

Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

Modeling & Analytics of Sustainable, Resilient and Robust Enterprises

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Submitted: April 2, 2014- Published: August 12, 2014
DOI: 10.7350/BSR.D09.2014 – URL: http://dx.medra.org/10.7350/BSR.D09.2014

ABSTRACT

The Sustainable Enterprise Excellence (SEE) approach of Edgeman and Eskildsen (2014a) is amended to embed resilience and robustness. This delivers the SEER^2 Model and Assessment Regimen. Simultaneous and sustainable attainment of enterprise sustainability, resilience, and robustness at superior levels leverages general and social-ecological innovation (Edgeman & Eskildsen, 2012), enterprise intelligence & analytics, operational and supply chain excellence, and enterprise human ecology as enablers. SEER^2 deploys enterprise governance (Edgeman 2013a; Elkington 2006) and 3E Triple Top Line (TTL) strategy (McDonough & Braungart 2002a) focused on generation of economic benefit to firm stakeholders, development and equitable distribution of social benefits, and environmental stewardship to deliver Triple Bottom Line (TBL) 3P (people, planet, profit) performance and impact (Elkington 1997) while also rendering the enterprise robust and resilient (Edgeman, 2013b).
Continuously transforming TTL strategy into superior TBL performance and impact is central to global policy change (Anderies et al., 2013) and is a hallmark of continuously relevant and responsible organizations (Edgeman et al., 2013a). Such transformation is focal to SEER^2 and weds enterprise excellence modeling typified by those of the European Quality Award and America's Baldrige National Quality Award or the balanced scorecard with the sustainability movement symbolized by the Global Reporting Initiative, UN Millennium Development & Sustainability Goals, and the 10 principles of the United Nations Global Compact. This effort "makes soft measures harder" via maturity scales and a combined narrative and dashboard performance report, making SEER2 the first model and assessment regimen to simultaneously address enterprise sustainability, excellence, resilience and robustness.

Keywords*:* dashboard technology, maturity assessment, resilience, robustness, social-ecological innovation, triple top line, triple bottom line.

1. INTRODUCTION

Sustainable enterprise excellence (SEE), *resilience* and *robustness* (R^2) are important, desirable and related enterprise traits, but are not wholly consonant, with objectives that differ in subtle yet important ways. A third R, *resplendence*, is addressed briefly herein. Together these may be

represented as $SEER^2$ or $SEER^3$ – with characterization depending on how resplendence is generated – whether independently, as a consequence of SEE, resilience and robustness, or in some other manner. These are activated by appropriately implemented multiple common factors or enablers, among others being big data intelligence & analytics, operational & supply chain proficiency, and innovation. Complex interrelationships involving $SEER^2$ and its enablers are explored, with two enablers particularly emphasized: innovation, along with IT enhanced big data intelligence & analytics (Melville 2010).

While numerous forms of innovation are important to $SEER^2$, the emphasized form is social-ecological innovation (Edgeman & Eskildsen, 2014b) or SEI, a key factor in organizational transition toward sustainability (Smith & Raven, 2012) with enterprise manifestation at the interface of *sustainable innovation* and *innovation for sustainability* (Rennings 2000). Sustainable innovation (Nill & Kemp, 2009) pervades organizational culture when innovation is regular, rigorous, systematic, systemic and strategic. Innovation for sustainability explicitly targets social or environmental objectives with the intent of delivering improved financial performance or other tangible benefits to the organization (Orlitzky et al., 2011), that is, TTL benefits which are directly traceable to such innovation. Innovation for sustainability is more likely, though not of a certainty forsaken under more turbulent, less promising economic conditions (Harwood et al., 2011; Sekerka & Stimel, 2011) so that clarity concerning the costs and benefits of SEI is of critical import (Sprinkle & Maines, 2010). In purely environmental applications SEI may be referred to as eco-innovation (Carillo-Hermosilla et al., 2009).

We will subsequently elaborate resilience, robustness, sustainable enterprise excellence, social-ecological innovation, and big data intelligence & analytics separately and in relation to one another. Consideration of resplendence or other key enablers of $SEER^2$, the model and assessment schema for which unify these with other key factors will be limited. The aims of such models and assessment technologies are to deliver insight into recent organizational performance, including operational and strategic successes and failures as well as areas where performance differed significantly from projections in form or magnitude. Perhaps more importantly, they purpose to provide enterprise foresight that inform and shape future enterprise strategy and tactics, leading to *next* best practices and sources of competitive advantage.

2. SUSTAINABILITY, EXCELLENCE, RESILIENCE AND ROBUSTNESS

Sustainable enterprise excellence results from integration and harmonization of selected principles emphasized by the enterprise excellence and sustainability movements that have developed largely in parallel over the past quarter century, with each having much deeper historic roots (Edgeman & Eskildsen, 2013). The enterprise excellence movement is often associated with the balanced scorecard (Kaplan & Norton, 1992) and the models and criteria supportive of the European Quality Award and America's Baldrige National Quality Award (Balasubramanian et al., 2005; Jacob et al., 2012). These stress superiority of financial performance, quality and productivity, human ecology performance (Edgeman et al., 2013b), customer and marketplace performance, operational and supply chain performance, and other domains. Relative to enterprise *sustainability* we intend the ability of an enterprise to create and maintain economic, environmental and social value for itself, its stakeholders and society at large, in both the short and long terms (Boston Consulting Group & MIT Sloan Management Review, 2013). Key principles of the sustainability movement are in differing ways embedded in the ISO 14000

Environmental Management Standards (King et al., 2005), ISO 26000 Social Responsibility Standard (Castka & Balzarova, 2007), Global Reporting Initiative (GRI) aspects, 10 Principles of the United Nations Global Compact or UNGC (Kell 2012), United Nations Millennium Development Goals (Sachs 2012) that are in transition toward UN sustainable development goals (Griggs et al., 2013), and the 1987 Brundtland Commission declaring sustainable development as development meeting the needs of the present generation without compromising the ability of future generations to meet their own needs (Shrivastava 1995; Wood 1991).

Sustainability is both an emerged megatrend (Lubin & Esty, 2010) and *the* key driver of innovation (Nidumolu et al., 2009), though of course the relationship is more circular: innovation enables sustainability while sustainability issues motivate innovation. This is a positivistic view since any given thrust is subject to perversion or sabotage leading to realization of negative consequences in what may be called the "bad robot" phenomenon.

Innovation enables enterprise *resilience* and *robustness* where in some constructs resilience and innovation are inextricably linked. To wit, Reinmoeller and Van Baardwijk (2005) characterize *resilience* as an enterprise's capacity to self-renew over time through innovation. More extensively, *resilience* is an enterprise's ability to continually change, reinvent itself, and adapt its responses (Contu 2002; Folke 2006) in order to rebound or recover from negative shocks or extreme challenges in a multi-faceted ecosystem that includes political, social, economic and other aspects in its competitive domain. In contrast, *robustness* is enterprise resistance or immunity to impacts from such shocks or challenges through formation and execution of an array of enterprise strategies, policies, partnerships, and practices (SP^3) that transform extreme challenges into opportunities to maintain or advance enterprise competitive position.

Design for *robustness* is well-understood in engineering contexts as maintenance of the integrity of a system subjected to external, unpredictable perturbations or subject to uncertainty in its design parameters. *Robustness* implies that system outputs are insensitive to system input changes (Csete & Doyle, 2002). Analogous to robust product design, design for enterprise robustness involves tradeoffs between SP^3 approaches producing optimal performance versus those delivering greater robustness. This dilemma arises since performance of a robust product, process, system or enterprise rarely matches the efficiency of a less robust "optimum" design but, in exchange, does not deteriorate as rapidly or precipitously as its non-robust counterpart (Anderies et al., 2004).

When extrapolated beyond products and services to the enterprise level, *design* is a battery of control processes that gather information from the enterprise, and subsequently transform it into actionable and implementable intelligence. In some instances these processes may be more mechanical and in other instances may manifest as policies that translate intelligence into action that feeds back into the enterprise. This characterization of robust enterprise design implies the following, all of which are fully transferable in relation to assessment of organizational progress toward any given objective, including $SEER^2$:

- Assessment of robustness anticipates explicit use of performance measures reflecting relative maturity;
- The nature and magnitudes of enterprise uncertainty are defined, even if not necessarily well understood and only crudely quantifiable;
- Analysis of robustness addresses trade-offs between robustness and performance; and

– Analysis of robustness addresses change in performance in the face of various perturbations or shocks.

More complete and accurate elaboration of an enterprise's external environment together with better anticipation of any real or potential embedded shocks to the enterprise and their array of probable impacts provides opportunity and motivation to formulate contingency or safety strategies. This observation harkens to the value of enterprise intelligence and – in some cases – big data analytics, particularly when complex interactions exist that magnify the importance and preference of an optimal (single) integrated solution to a complex scenario in contrast to a simple combination of multiple "optimal" solutions to sub-scenarios that do not adequately account for such interactions (Chichilnisky & Wu, 2006).

Although there is a relationship between organizational resilience and organizational robustness, since they are neither identical, nor of necessity fully compatible, the implication is that an SP^3 set maximizing resiliency may not be identical to the SP^3 set maximizing robustness. As such, a critical organization design consideration is determination of an enterprise form that jointly optimizes resilience and robustness. Whenever there are differences in the SP^3 sets maximizing resiliency and robustness, the organization should exercise care to elaborate and make informed choices among tradeoffs between *resiliency* and *robustness* so that any choice of organization design and SP^3 leads ultimately – at best – to a constrained optimum.

As with many constructs, this in part implies that single measures of *resilience* and *robustness* are inadequate since each of these manifests within high-dimensionality spectra with non-orthogonal dimensions, and hence complex interdependencies. In an effort to better balance the various considerations of such tradeoffs Edgeman and Williams (2014) have formulated a calculus of resilience and robustness.

In addition to innovation, risk mitigation and vulnerability reduction (Scholz et al., 2012) are widely acknowledged *resilience* and *robustness* dimensions. The ability to breach barriers to change and intentional diversification of the portfolio of areas in which an enterprise possesses or is capable of developing competitive advantage provide two further means of enhancing *resilience* and *robustness* (Hamel & Välikangas, 2003), with yet another means provided by strategic selection of innovation strategy, practices, and targets. In particular, enhanced *resilience* and *robustness* may be advanced by deliberately embedding of SEI approaches such as cradle-to-cradle design (McDonough & Braungart, 2002b) and biomimicry (Benyus 2002) in an enterprise culture of sustainable innovation.

Integration of enterprise excellence and sustainability principles necessitates migration away from singular emphasis on profitability toward a more holistic and strategic view of firm performance that blends social, environmental, and financial perspectives. Together these are often referred to as 3P or "people, planet, profit" (Van Marrewijk & Werre, 2003). Active integration of these in innovation strategy that leverages biomimetic, cradle-to-cradle, and other higher-order design methodologies and principles is increasing, with such exemplar organizations as IBM leading the way (Bjelland & Wood, 2008). Such methodologies will ordinarily support the key sustainability principle of closed loop supply chains and material flow wherein end-of-life products supply energy or material for subsequent products or processes (Guide & Van Wassenhove, 2009; Souza 2013).

What we see in summary is that enterprise excellence, sustainability, resilience and robustness are consistent, though not wholly congruent. As such these are each advanced by various common enablers, yet strategies, policies, partnerships and processes optimizing one of these are

not likely to optimize the others – implying that the overall "best" solution will be one that requires compromise in what is commonly referred to as a constrained optimum.

3. SELECTED ENABLERS OF SEER^2 AS RESILIENCE & ROBUSTNESS

$SEER^2$ includes both enablers and results. Many $SEER^2$ elements hold long-standing stature in established enterprise excellence models. Here we examine a few $SEER^2$ enablers whose roles relative to resilience, robustness or both are less well understood. In particular we briefly explore the roles of human capital; operational and supply chain strategy, processes, and actions; and enterprise governance and strategy in relation to resilience and robustness. Innovation and big data intelligence & analytics are reserved for deeper examination.

Strategic management of human capital resources to create competencies among core employees makes it possible for enterprises to respond to severe shocks in a resilient manner, particularly when competencies are aggregated at the organizational level (Lengnick-Hall & Beck, 2005). Critical human capital elements central to developing resilience capability include selected cognitive abilities, behavioral traits, and organizational / applications context, where these are subject to blending via human capital policies and practices (Lengnick-Hall et al., 2011). A human capital concern critical to resilience and robustness – not to mention enterprise excellence – is that of ambidextrous learning that enables enterprises to exploit existing knowledge domains while simultaneously exploring new ones. Selected human capital configurations are far more supportive of ambidextrous learning than others (Kang & Snell, 2009).

Excellence models have traditionally focused on organizational senior leadership rather than the larger hybrid of governance and leadership embraced by $SEER^2$ (Edgeman 2013a). That said, high profile corporate (ethical) failures leading to the Sarbanes-Oxley Act of 2002, New York Stock Exchange Corporate Governance Rules, and follow-on legislation and regulations acknowledge societal and political expectations of corporate governance. A Booz Allen Hamilton study of corporate governance concluded that governance is capable of delivering enterprise resilience, robustness, and continuously improved enterprise performance, but that a combination of soft factors related to the board of directors and hard factors that include performance criteria, processes, and measurements are essential if governance is to be transformed from a vague concept into an engine for enterprise resilience, robustness, and performance (Kocourek et al., 2003). The $SEER^2$ model and assessment technology specifically rely on performance criteria and measurement of these relative to defined maturity scales. Elkington (2006) notes the value of governance to enterprise sustainability, where a governance-leadership hybrid may be expanded to include the element of *capture*. Capture focuses on market expansion, whereas governance and leadership are related to enterprise capacity to assimilate, retain, defend and increase dominance with tactics of isolating and weakening adversaries, creating forward outposts, maintaining a strong base, and saving and consolidating power – all of which are strategies aimed at creating more enduring, resilient, and robust organizations (Carmeli & Markman, 2011).

Supply chains are comprised of a system of enterprises, people, activities, information and resources involved in producing and moving a product or service from supplier to customer. Superior supply chains are fast, cost-effective, agile, adaptable, and able to ensure that all of the enterprises' interests remain aligned so that they are robust and resilient (Lee 2004). The importance of supply chain resilience and robustness have become obvious in the wake of severe disruptions resulting from the terrorist strikes of September 11, 2001 (Christopher & Peck, 2004),

natural disasters such as the 2004 Indian Ocean tsunami, the 2011 meltdown of three nuclear reactors in Japan, and Superstorm Sandy in 2012. At the enterprise level, more than 90% of companies surveyed by PriceWaterhouseCoopers (2013) indicated that supply chain disruptions significantly affect business and financial performance. Strategies aimed at increasing operations and supply chain resilience and robustness typically focus on managing and minimizing operational and supply chain risk (known unknowns) and reducing uncertainty (unknown unknowns). Such risks and uncertainties include potential impact on assets and related services that might result from inadequate or failed internal processes, systems, technology, actions of people, or external events leading to corruption or disruption in enterprise operations or its supply chain (Gulati et al., 2010). Thorough management of operational and supply chain resilience uses protection strategy that seeks to prevent realization of operational risk and uncertainty in high-value services or disruption in supply of key resources; sustains high-value services or supply sources when risk is realized; effectively and efficiently deals with results and ramifications of realized risks and uncertainty to restore the organization to its prior steady state; and fulfills these goals at lowest cost, least negative social consequence, and least damaging environmental impact.
It is thus that we seek to design, create and implement more resilient and robust operations and supply chains. Strategies and approaches for achieving this goal include risk segmentation; increasing operations and supply chain flexibility and agility; improving operational and supply chain maturity and risk management (PricewaterhouseCoopers, 2013); improving information sharing and security throughout the supply chain (Cachon & Fisher, 2000); increasing trust and collaborative relationships among supply chain partners (Faisal et al., 2006); enhancing corporate social responsibility (Sydow & Frenkel, 2013); and better aligning incentives and revenue sharing policies across the supply chain (Tsay 1999).
We see then, that operational and supply chain proficiency, enterprise strategy and governance, and strategic management of human capital each enable attainment of enterprise resilience and robustness. Moreover, it is clear that these interact and that appropriate interaction can multiply their impact so that enterprises must be aware of and manage these interactions.

4. BIG DATA INTELLIGENCE & ANALYTICS IN SEER^2

Hallmarks of big data include richer and more numerous data sources; massive data volume and variety; dramatic growth in data storage capacity and processing speed; and quantum leaps in analytic capability and graphic intricacy. This combination has led to deeper exploration and analysis of less well-understood data types that include textual, web, network, mobile, and big data and analytics (Chen et al., 2012) that can be used in increasingly complex or novel environments that demand highly efficient, effective, rapid and customized translation of data into intelligence, intelligence into foresight, and foresight into value (LaValle et al., 2011). Included among more recent such developments are stratography that contributes to graphic conceptualization and communication of enterprise strategy (Cummings & Angwin, 2011).
The enterprise excellence focus on big (and small) data analytics and intelligence reflects the inevitable progression resulting from extension of quality management practices and principles in relation to product, process or system performance to whole enterprise and supply chain dynamics and performance. Quality management has long esteemed data driven decision making, management and strategy (Apte et al., 2002), however the game changer has been the relentless advance of information technology that in keeping with Moore's Law (Jiang et al., 2011) has

long delivered exponential growth in information storage capacity, processing speed and intelligence extraction that has ushered in the "big data era" (McAfee & Brynjolfsson, 2012). As such enterprises are transitioning away from traditional data driven decision making toward a blend of this time honored approach with vastly more complex and computationally-intensive big data analytics that may yield mixed quantitative, qualitative and visual forms.
The importance of big data intelligence and analytics to enterprises is evolving so rapidly that noted organization design authority Jay Galbraith (2012) cites them as critical organization design components capable of supporting competitive strategy that enables organizations to operate both differently and more intelligently than their competitors and hence providing additional avenues to resilience and robustness (Voelpel et al., 2005). Consistent with Galbraith, application of big data intelligence & analytics to value and supply chain design and optimization carries with it the potential to transform "connected intelligence" into "integrated collective intelligence". Connected intelligence is ordinarily – at best – additive in the sense that knowledge is summative across the chain. In contrast, integrated collective intelligence is multiplicative and better enables best-practice identification, sharing and integration, thus transforming best practice into common or usual practice or, in some cases, may be recombinant in that best practice fragments may be collected across the chain and combined (integrated) in ways that lead to *next* best practices and sources of competitive advantage deployed more pervasively across the chain – a topic that is intimately related to the ability of the organization to develop big data intelligence and analytics as a core competence that in turn contributes to TBL sustainability (Zhou et al., 2013).
The preceding discussion highlights just one of many examples of how organizational progress toward SEER^2 may be advanced through use of sophisticated, IT-enabled analytic transformation and translation of information into actionable enterprise intelligence and foresight. The importance of big data intelligence and analytics to sustainability (Gijzen 2013), operational and supply chain efficiency and effectiveness (LaValle et al., 2011), financial performance (Brown et al., 2011), knowledge management (Davenport et al., 2002), innovation (Conway & Klabjen, 2013), resilience (Pettit et al., 2013), and robustness (Preis et al., 2012) – all of which generate massive amounts and variety of information – are thus widely recognized, even if not always well understood. Increasingly then, organizations cannot afford to ignore big data intelligence and analytics – not because they provide failsafe identification and evaluation of all important organizational issues and decisions, or that they ensure subsequent derivation of uniformly better solutions than use of traditional data driven decision making – but rather because of the rapidly increasing volume of information generated from which intelligence and foresight that account for complex interactions of factors must be extracted.
While not assured, big data intelligence and analytics promise generally improved solutions to complicated organizational challenges that yield better supply chain navigation along with improved financial, societal and ecological performance. In this latter regard, organizations are increasingly incorporating social-ecological factors into their intelligence and analytical evaluations of enterprise competitive context as a means for improving performance through generation and implementation of strategic foresight (Petrini & Pozzebon, 2009) so that use of big data intelligence and analytics in combination with advanced design and innovation methodologies such as six sigma will for many organizations be critical to progress toward SEER^2 (Edgeman 2013b).
It is certain that the promise and potential of big data intelligence and analytics is intoxicating. On a precautionary note, however, it is often said "with great power comes great responsibility".

The power of big data intelligence and analytics further underscores the importance of data confidentiality as well as security in a more comprehensive sense in order to protect against industrial espionage (Crane 2005) that can yield devastation analogous at enterprise levels to that wreaked by the 2008 cyber-attack on the United States Defense Department (Lynn 2010). This implies the sensibility of integrating security and privacy among SEER^2 measures.

5. INNOVATION AND SOCIAL-ECOLOGICAL INNOVATION IN SEER^2

In essentially any context sustainability may be regarded as a capacity to endure, with the TBL formulation supporting a perspective well captured by the phrase: lean, green, ethical and real (Edgeman & Eskildsen, 2012a) as an extension and integration of lean approaches (Scherrer-Rathje et al., 2009) with green or environmental emphasis (Ginsberg & Bloom, 2004). We have:

- *Lean* refers predominantly to conservation of non-environmental resources;
- *Green* is associated with conservation of non-renewable natural resources, wise use of renewable resources, and limitation of environmental footprint;
- *Ethical* is related to commitment to and practice of social equity and justice, community involvement and contribution, and positive regard for treatment of the enterprise's human capital, and
- *Real* implies lean, green, and ethical practice with concomitant results that include financial, societal, and environmental results.

Sustainability thus composed has been identified as an emerging source of competitive advantage (Laszlo & Zhexembayeva, 2011) wherein effective environmental policy is a documented driver of firm value (Al-Najjar & Anfimiadou, 2012). Just as solid environmental policy is positively correlated to firm value, so too has effective implementation of enterprise excellence models so that various attempts have been made to integrate these approaches (Asif, et.al 2011; Avlonas & Swannick 2009; Salzmann et al., 2005).

It is well-established that innovation in general and SEI in particular is a key thread integrating the gains realized by effective environmental policy implementation and effective use of enterprise excellence models (Hansen & Wernerfelt, 1989; Samson & Terziovski, 1999; Pujari, 2006). Innovation of the form pursued herein, then, is innovation that addresses societal, environmental and financial performance and thus integrates sustainability and enterprise excellence regularly, rigorously, comprehensively, systematically, and profitably, that is, social-ecological innovation. Innovation is a joint responsibility of an enterprise's governance, leadership and human capital that is advanced through activity at the co-creative interfaces of the enterprise with its customers (Hoffmann 2012) and society (Edgeman & Fraley, 2008).

Organizations pursuing SEER^2 are engaged in pursuit of continuously relevant and responsible strategy, action, performance and impact – a pursuit that organizational structure can enhance or accelerate (Atkinson et al., 2000). In this context *continuous* implies regularity in both practice and performance, while *relevant* and *responsible* refer especially to social equitable, fiscally sound, and ecologically sensitive practice, outcomes (e.g. impacts). Routine iterative generation and implementation of enterprise foresight is critical to this pursuit where the generative process will commonly involve application of big data intelligence and analytics capabilities that aid development and coalescence three innovation perspectives germane to SEER^2:

- The *strategist* perspective elaborating new business fields in which SEER^2-driven innovation may occur;
- An *initiator* perspective that increases the number of SEER^2-driven innovation concepts; and
- The *oppositional* perspective that challenges SEER^2-driven innovation projects in order to elevate their performance (Rohrbeck & Germünden, 2011).

While the creative spark is widely recognized and valued in innovation, the process of selecting innovation projects and targets when confronted by multiple opportunities may be aided by the use of innovation tournaments (Terwiesch & Ulrich, 2009) with tournament entries represented by the portfolio of enterprise innovation prospects. The tournament process then seeks to identify and subsequently pursue the most exceptional such prospects. Central to pursuit of SEER^2 inspired innovation is that criteria defining *exceptional* prospects will include and perhaps emphasize SEI so that social and environmental benefits and impacts will ultimately prove influential in selection of innovation opportunities that are pursued. It should be noted that a shift toward a new equilibrium in the balance of exploration-based and exploitation-based innovation opportunities sought and pursued is almost surely consequential to adoption of SEER^2 driven organizational culture and strategy (Raisch et al., 2009).

5.1 Embedding SEI in SEER^2 Driven Enterprise Culture

The importance of SEI to SEER^2 necessitates understanding its contribution to value creation:

- SEI efforts will in some instances be generally consistent with lean approaches that focus on reducing cost, risks, waste, and delivering proof-of-value (Scherrer-Rathje et al., 2009);
- SEI should in other instances direct attention to redesign of selected products, processes, or business functions to optimize their performance and hence advance from doing old things in new ways to doing new things in new ways – that is, to value-creation (Edgeman & Eskildsen, 2014b);
- Integrate SEI and other innovation approaches into core strategies to drive revenue growth (Skarzynski & Gibson, 2008).

In like manner to effective integration of enterprise excellence approaches and environmental policy that positively impact firm value, embedding a culture of sustainability produces multiple positive enterprise impacts (Eccles, et.al. 2012). Relative to SEER^2, a significant aspect of such culture is innovation in general and SEI specifically. At issue then, is creating, cultivating, and advancing enterprise culture that embraces sustainability, SEER^2 and SEI – an effort supported by adapting the "tipping point" philosophy of human capital (Gladwell 2008) suggesting enterprises should be peopled by a strategic blend of and collaboration among *connectors* who build key enterprise bridges, *mavens* that provide creative and innovative energy, and *sales agents* that herald innovation and sustainability-driven value delivered to the enterprise where it is likely that given individuals might at different times assume differing or multiple simultaneous roles. In complementary fashion, noted innovation authority Tim Brown, CEO of IDEO, the world's leading innovation and design firm (Davenport et al., 2002) – is that interdisciplinary collaboration is crucial to such an enterprise culture and the pursuit of such culture. Table 1 provides recommendations consistent with Brown's perspectives (Brown 2008), but directed toward embedding such culture in an enterprise in order to advance SEER^2.

Table 1. Embedding Socio-Ecological Innovation in Enterprise Strategy & Culture

Focus	SEI Strategy and Actions
Innovation from the outset	Engage in structured ideation and innovation (Goldenberg et al., 1999; Hauser et al., 2006) before any direction has been set in order to expand the potential solutions space, thus creating more concept fragments and better likely eventual result. Actively include the "eco-voice".
People-centered innovation	Leverage people-centered design thinking to capture unexpected insights and produces innovation that more precisely reflects consumer and societal wants and needs. Conduct ethnographic research to directly observe the user environment (Deshpande & Webster, 1989).
Rapid development	Demand rapid experimentation and prototyping, with constant consideration of environmental and societal impacts and hence sustainable solutions. Assess progress with creativity metrics such as time to first prototype.
Co-creation focus	Expand the enterprise innovation ecosystem through engagement of users and society (Edgeman & Eskildsen, 2012b).
Innovation portfolio	Manage an innovation portfolio that spans and strategically blends short-term incremental ideas to long-term evolutionary ones. Build efficiency wile also stimulating broad experimentation and strategic variety, requiring that a significant subset of the portfolio have an SEI emphasis to ensure relevant and responsible innovation. This strategy aims to secure profitability from SEI, while also building enterprise resilience and robustness (Lavie et al., 2011).
Pace of innovation budgeting	Although innovation is often rapid, commercialization is often a more turbulent prospect that is sensitive to intellectual property considerations. Since complex budgeting cycles constrain the pace of innovation enterprise leadership must possess sufficient agility to allocate and reallocate budgetary resources as opportunities arise (Govindarajan & Trimble, 2010).
Talent capitalization	Human capital is a key enabler of both SEI and SEER^2. Build enterprise human capital with interdisciplinary talent and orientation. Provide innovation, design, and sustainability training strategically throughout the enterprise.
Design for the cycle	Rapidly rotate human capital in order to provide experience across the inspiration-to-ideation-to-implementation cycle and increase organizational ambidexterity (Jansen et al., 2005), thus generating better judgment and creating long-term benefits for the enterprise that includes improved understanding innovation impact on all sustainability dimensions.

Source: Adapted from Brown (2008) and Edgeman and Eskildsen (2012b)

While Brown provides a concrete multi-faceted SEI strategy and Gladwell suggests human capital composition, numerous others (e.g., Olsson & Galaz, 2011; Gauthier & Wooldridge, 2012; Eccles & Serafeim, 2013) have suggested adaptable roadmaps for embedding SEI strategy within and throughout the enterprise across all functional areas, activities, and results in order to successfully, profitably, and simultaneously transform 3E triple top line strategy into 3P triple bottom line performance, becoming increasingly agile and innovative while doing so. Adapted to SEI integration, such roadmaps collectively suggest:

- Make SEI core to enterprise vision and strategy, actively and deeply embedding translation of 3E triple top line strategy into superior 3P triple bottom line performance;
- Contribute SEI-driven solutions to specific challenges without creating new challenges;
- Gain the support of key stakeholders;
- Saturate all parts of the enterprise with SEI;
- Stress SEI performance and communicate success;
- Architect a board level authority with the will to make a difference via SEI – including enrichment of human life and society without eroding of life-supporting ecosystems;
- Set measurable SEI goals and monitor progress toward their fulfilment;
- Build, enrich, harness, and leverage the power of individual and collective human capital;
- Actively participate in key networks and engage at the co-creative enterprise-culture, enterprise-user, and enterprise-environment interfaces, leveraging the creativity and ingenuity of users, workers, consumers, citizens, activists, and businesses, thus rebuilding enterprises as communities (Mintzberg 2009);
- Less saleable, ensure that SEI is applied to work more thoughtfully and directly toward social justice, poverty alleviation, environmental sustainability, and democracy, rather than applying it exclusively to derivation individual or corporate profit (Olsson & Galaz, 2011).

In addition to the aforementioned policies, strategies and actions supportive of SEI penetration and saturation, Edgeman and Eskildsen (2014) have identified and elaborated complementary generic and context specific ones they refer to as 10R (basic) and 10A (advanced) SEI strategies and actions. The basic SEI actions and strategies include the familiar "reduce, reuse, recycle" call for environmental responsibility, along with replace, rethink, redirect, renew, reconsider, redesign, and reinvest. The more complex and strategically advanced SEI approaches include business model innovation, support for innovation, innovation insight, innovation foresight, innovation competencies and technologies, innovation readiness, new product and service innovation and design, socio-ecological innovation strategy, and systematic change integration.
The primary objective of springboard models is to provide useful feedback and foresight through a simple, accessible technology. SEI and general innovation play prominent roles in sustainable enterprise excellence and are featured in the *Springboard to SEE* model (Edgeman & Eskildsen, 2014a) that is next revised and extended to form a *Springboard to SEER*^{2}. Prominence of SEI in the Springboard to SEER^2 traces additionally to its ability to reduce enterprise fragility in general and its financial system in particular (Klemkosky 2013) and hence contribution to enterprise resilience and robustness.

6. A SPRINGBOARD TO SEER^2 MODEL

Models such as the balanced scorecard, international quality award models, and many others are used to conduct regular, rigorous, comprehensive and systematic review of all relevant strategy, activities, and results for enterprise self-assessment purposes. *Relevant* is understood to mean

"relevant to whatever the model seeks to assess and discover", whereas *comprehensive* implies thorough examination and discovery of intelligence relevant to areas assessed by the model. Chief among self-assessment aims are that it should provide feedback and foresight to the enterprise that stimulates improvement, informs strategy, and contributes to the greater likelihood or reality of identification, strategic selection, and implementation of *best* and *next best* practices and sources of competitive advantage.

Understood is that such models *do not* assess *everything* in the enterprise, instead emphasizing assessment relative to key model elements. For example, governance is not assessed in the same way as strategy, but it is assumed that the enterprise otherwise carefully addresses governance. As SEER^2 emphasizes SEE, resilience and robustness, enterprise self-assessment demands analysis of the quality of enterprise strategy, activities, performance, and impact relative to SEER^2 as part of the larger effort of understanding enterprise health (feedback). This is combined with intelligence concerning competitive, market, societal, political, and environmental conditions and trends to inform future strategy and action (foresight).

At its conceptual core the *Springboard to SEER*^{2} is similar to many enterprise excellence models in that enterprise governance, executive leadership and strategy formulate policies and priorities that are transformed into performance results through people, partnerships and processes. These three primary divisions form the blocks of the Springboard model of Figure 1. High-level review of the Springboard to SEER^2 reflects this concept with the model proceeding from left-to-right from strategy & governance to process implementation & execution to performance results. A typical and intentional product of the analysis process is enterprise navigation away from a red ocean competitive bloodbath toward a more advantageous voyage in a competitively more pristine blue ocean (Kim & Mauborgne, 2005).

Production of a SEER^2 model and assessment regimen can be approached through adaptation and extension of the *Springboard to SEE Model* and associated assessment strategies and tools that include maturity measurement, *SWOT Plot Narratives*, *SEE NEWS Compasses*, performance dashboard technology, and the *SEE NEWS Report* (Edgeman & Eskildsen, 2014a). Six primary areas of the *Springboard to SEER*^{2} are subjected to assessment: Triple Top Line Strategy & Governance (1), Process Implementation, Translation & Execution (2), and the four performance areas of the Triple Bottom Line Performance & Refinement block – Financial & Marketplace Performance (3), Sustainability (4), Human Ecology & Capital (5), and SEI & General Innovation and Continuous Improvement (6). By human ecology (Lozano, 2011) we intend the relationships between the enterprise and its human capital with the social, natural, and built environments via whatever mediators are pertinent.

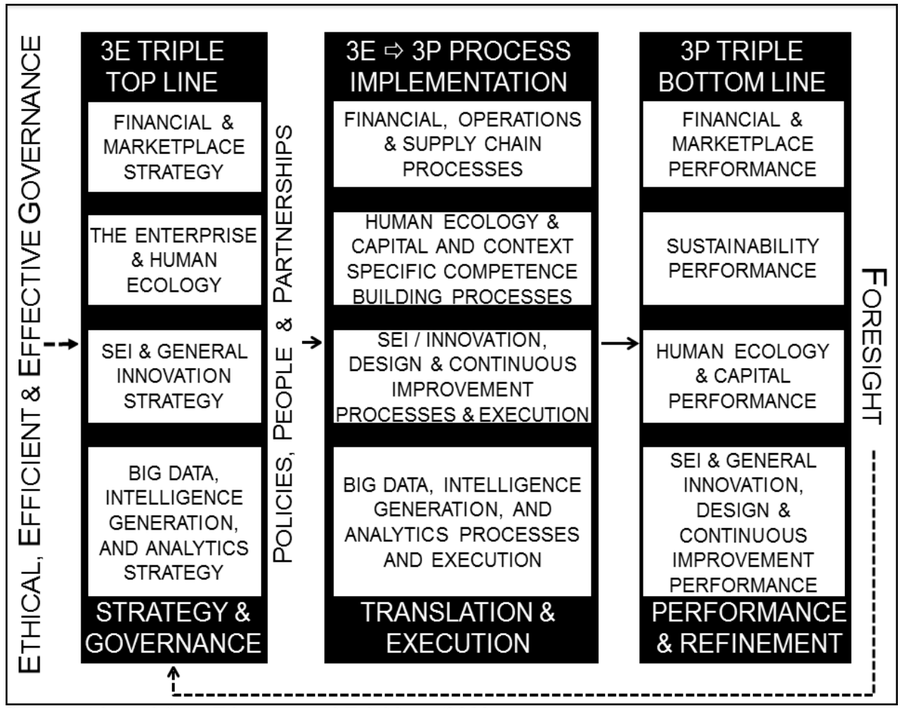
A "compass" is formed for each primary areas by assessing four perspectives or criteria (see Table 2) designated as navigational "compass" directions N (north), E (east), W (west), and S (south)– albeit rearranged to render the NEWS acronym.

NEWS conveniently serves three main self-assessment purposes in that it is *easily remembered*, carries with it the connotation of *direction* (compass) enterprise assessment is intended to supply, and provides an easily recalled companion to direction – *news* concerning enterprise health and the way forward with respect to *Sustainable Enterprise Excellence*, *Resilience* and *Robustness*.

It may be debated whether the ideal number of perspectives for each compass is four or should be more, less or variable. Equally, other modelers might select alternative perspectives or describe the provided ones differently. Similarly, the Springboard employs 0-to-10 maturity scale differentiation for each perspective assessed and other modelers may describe maturity differently or select a different scheme. Although such issues may never be fully resolved, these

and similar considerations are inherent to assessment so that awareness is important in order to minimize or altogether avoid the pitfalls of employing questionable methodologies (Porter & Kramer, 2006), whether those methodologies are employed to assess corporate social responsibility, sustainability, enterprise excellence, resilience, robustness, innovation capacity, or another area of interest.

Figure 1. Springboard to SEER^2 Model



Source: Adapted from Edgeman and Eskildsen (2013)

Table 2. *Springboard to SEER² NEWS Compass Point Elements*

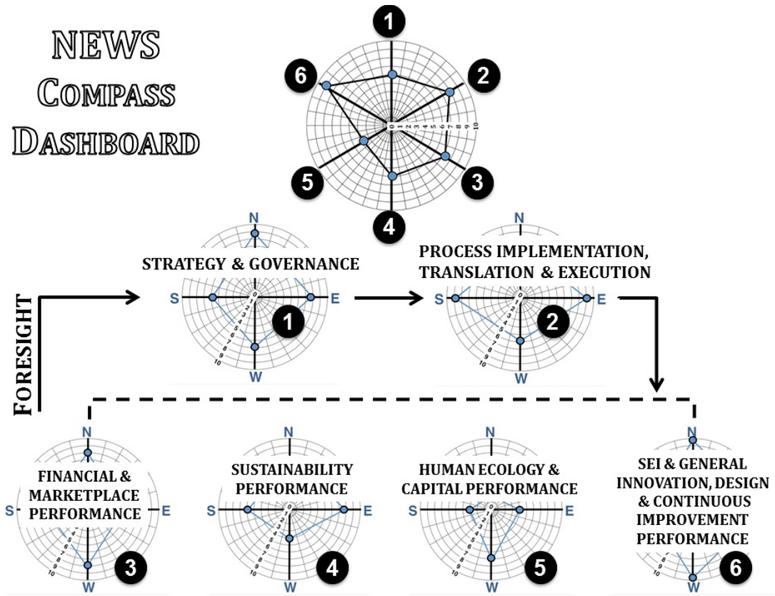
NEWS PERSPECTIVE	COMPASS DIMENSIONS
	TRIPLE TOP LINE STRATEGY & GOVERNANCE (1)
N	Financial & Marketplace Strategy for SEER² & Supply Chain Strategy
E	The Enterprise & Human Ecology Strategy
W	Social-Ecological Innovation (SEI) and General Innovation Strategy
S	Big Data, Intelligence Generation, and Analytics Strategy
	PROCESS IMPLEMENTATION, TRANSLATION & EXECUTION (2)
N	Financial, Operations & Supply Chain Processes for SEER²
E	Human Ecology, and Context Specific Competence-Building
W	SEI / Innovation, Design & Continuous Improvement Processes & Execution
S	Big Data, Intelligence Generation, and Analytics Processes & Execution
	FINANCIAL & MARKETPLACE PERFORMANCE (3)
N	Financial & Marketplace Results Traceable to Supply Chain Performance
E	Financial & Marketplace Results Traceable to Human Capital Investment
W	ROI & Reinvestment in Innovation, Design & Continuous Improvement: R&D
S	Financial & Marketplace Results Traceable to Big Data, Intelligence Generation, and Analytics
	SUSTAINABILITY (SEER²) PERFORMANCE W/ EMBEDDED ECONOMIC, INNOVATION, AND ANALYTIC IMPACT (4)
N	Sustainability Results Traceable to Supply Chain Performance & Analytics
E	Sustainability Results Traceable to Human Capital Engagement & Analytics
W	Environmental Sustainability Results & Refinement and Analytics
S	Societal Sustainability Results & Refinement and Analytics
	HUMAN ECOLOGY & CAPITAL PERFORMANCE (5)
N	Impact of Human Ecology & Capital on the Supply Chain
E	Impact of Human Ecology & Capital on Trajectory, Agility and Velocity
W	Impact of Human Ecology & Capital on Innovation Capacity
S	Impact of Human Ecology & Capital on Organization Design
	SEI & GENERAL INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT PERFORMANCE (CI) (6)
N	Impact of Innovation, Design & CI Across and In the Supply Chain on SEER²
E	Impact and Interaction of Innovation, Design & CI with Human Ecology & Capital on SEER²
W	Impact of Innovation, Design & CI on Other Non-Financials & Intangibles
S	Impact and Interaction of Big Data, Intelligence Generation, and Analytics with and on Innovation, Design & CI Relative to SEER²

7. SEER² MATURITY ASSESSMENT

N-E-W-S criteria are assessed relative to highly specific maturity criteria on a 0-to-10 scale for each of the six major assessment areas identified in Table 2. The scale is divided into five highly descriptive and progressive categories, with the possibility in each category of some discretion by an expert assessor. The categorical maturity ranges and labels are: (0-1) very low maturity, (2-3) low maturity, (4, 5, 6) moderate maturity, (7-8) high maturity, and (9-10) very high maturity. Maturity values for each N-E-W-S perspective are plotted on the appropriate dial of the Springboard to SEER² NEWS Compass Dashboard portrayed in Figure 2. The top dial in the dashboard has six axes rather than four (N-E-W-S) with each axis corresponding to one of the six primary assessment areas delineated in Table 2. The N-E-W-S perspectives associated with a given dial may be weighted, with preference for weightings that reflect the enterprise competitive context where, of course, non-negative weights must add to 1.00 (or 100%) within each primary assessment area as well as for the six axes of the summary "compass" positioned at the top dial of the dashboard.

A SWOT Plot Narrative similar to the generic one provided in Figure 3 is companion to each dial and these are in turn coalesced into a coordinated SWOT Plot Narrative Dashboard identical in construct to the Springboard to SEER² NEWS Compass Dashboard of Figure 2.

Figure 2. Springboard to SEER² NEWS Dashboard



Source: Adapted from Edgeman and Eskildsen (2013)

Figure 3. Generic SWOT Plot Narrative Format

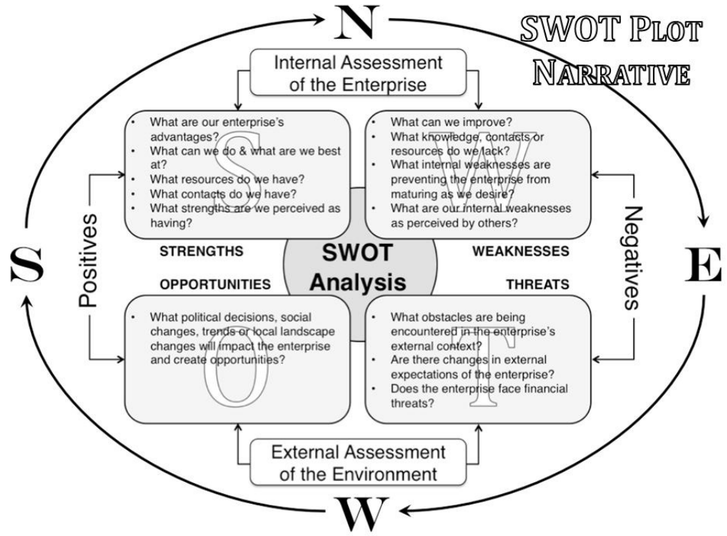


Figure 4. Springboard to SEER² NEWS Report

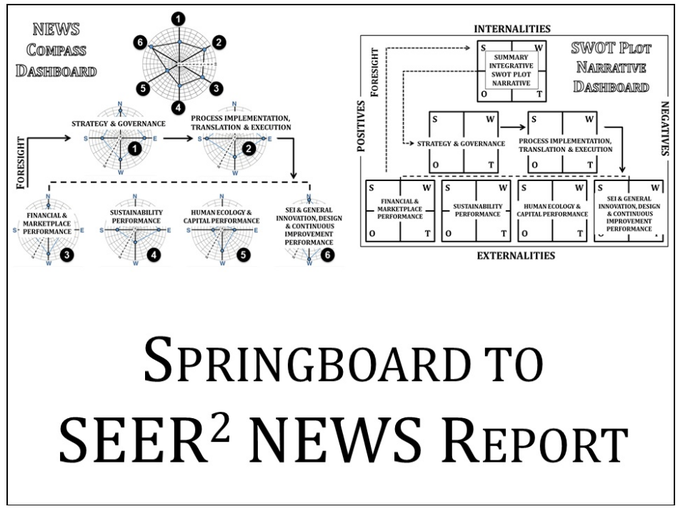


Table 3. *SEI & General Innovation, Design and Continuous Improvement Maturity Assessment*

S NEWS PERSPECTIVE	SEI & GENERAL INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT PERFORMANCE ASSESSMENT AREA (6)
IMPACT AND INTERACTION OF BIG DATA, INTELLIGENCE GENERATION, AND ANALYTICS WITH AND ON INNOVATION, DESIGN, AND CONTINUOUS IMPROVEMENT RELATIVE TO SEER²	**VERY LOW MATURITY: Low Awareness and Capability (0-1)** The enterprise generally has little or no awareness of big data, intelligence generation or analytic approaches and, similarly, little or no innovation, design or continuous improvement activity or capability. **LOW MATURITY: Sporadic or Reactive Capability (2-3)** Awareness of big data, intelligence generation or analytics approaches is limited. Similarly, innovation, design or continuous improvement activity is typically driven by short-or-near-term problems when seen as a necessity, rather than as a profit or other tangible gain opportunity. **MODERATE MATURITY: Early Systematic Approaches (4, 5, 6)** The enterprise is in the early-to-middle stages of embedding systematic and repeatable application of big data, intelligence generation and analytical approaches and connecting these to their innovation, design, or continuous improvement activities and is aware that application across the supply chain has the potential to generate additional benefits. **HIGH MATURITY: Aligned and Partially Integrated (7-8)** Widespread application of big data, intelligence generation and analytic capabilities relative to innovation, design and continuous improvement opportunities is the norm and the connection of these to financial performance is well-understood. Some other supply chain members are engaged and benefit is being derived both for the enterprise and those supply chain members. Some processes are benchmark quality. **VERY HIGH MATURITY: Deeply Integrated in Culture (9-10)** Essentially all key and supporting areas of the enterprise actively make both strategic and tactical use of relevant big data, intelligence generation, and analytic approaches that enable improved innovation, design and continuous improvement solutions. This is generally embedded across the supply chain and especially so with its key members. These are critical to foresight generation and inform future enterprise strategy. Multiple of the relevant related processes are world class.

SWOT, of course, refers to the familiar "strengths, weaknesses, opportunities, threats" analysis with strengths and weaknesses driven by controllable enterprise internalities, whereas opportunities and threats represent uncontrollable externalities (Blenko et al., 2010). As with the top dial of the NEWS Compass Dashboard, the uppermost narrative in the SWOT Plot Dashboard should represent a weighted or prioritized narrative that blends and harmonizes the narratives from the six primary assessment areas. The *NEWS Compass Dashboard* and *SWOT Plot Narrative Dashboard* are ultimately combined to yield the final assessment of Figure 4, referred to as the *Springboard to SEER² NEWS Report*.

While assessment provides an enterprise health review, a more critical expectation of enterprise self-assessment is that it should provide ample and *actionable* foresight. Translation: assessment aims to improve enterprise performance with particularly astute enterprises able to attain significant improvement and implement best and next best practices, strengthening existing or identifying new sources of competitive advantage.

Central to this effort is the ability to meaningfully estimate enterprise maturity with respect to each N-E-W-S perspective for each primary assessment area cited in Table 2. Table 3 provides an abbreviated example narrative maturity scale for the S perspective of the SEI & General Innovation, Design and Continuous Improvement Performance assessment area. Twenty-four such scales are required, with the beginning narrative generally similar at like maturity levels across the six primary assessment areas and N-E-W-S perspectives.

8. CONCLUSIONS

Sustainable enterprise excellence, resilience, and robustness ($SEER^2$) are hallmarks of high-performing organizations that thrive in good times and that successfully navigate more turbulent ones via pursuit of continuously relevant and responsible strategies, activities and results. Among key enablers of $SEER^2$ are superior triple top line enterprise strategy and governance and exemplary process identification, implementation, and execution that together generate superior triple bottom line performance.

The focus of the present work has been to provide a strategic and operational definition of $SEER^2$, develop an intentionally simple and easy to use Springboard to $SEER^2$ model, and to highlight key factors such as big data analytics, intelligence generation, and analytics; innovation in general and social-ecological innovation in particular; and enterprise human ecology. These efforts have been supported through development of maturity assessment along with graphic and narrative analytics that ultimately result in a Springboard to $SEER^2$ NEWS Report that produces both feedback on enterprise health and foresight that informs future strategy and activities, leading to best and next best practices and sources of competitive advantage.

Superior organization performance relative to $SEER^2$ is critical to long-term sustainable enterprise success and that is of course motivating to the stakeholders of most enterprises. Perhaps more important however, is the contribution of $SEER^2$ to positive societal and ecological performance.

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www.business-systems-review.org

Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

A Model for Reducing Pollution through the Channel of Reducing Income Inequalities: An application of an Indicator for Qualitative Progress: the case of Egypt and Lebanon

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Submitted: April 8, 2014- Published: August 12, 2014
DOI: 10.7350/BSR.D10.2014 – URL: http://dx.medra.org/10.7350/BSR.D10.2014

ABSTRACT

Uncertainty governs increasingly the future of societies carried by the adventure of modernity. The concrete support of modernity was the economic development which mission was to provide well-being and the successive stages of human progress. But the adventure of modernity turns to a misadventure because the development threatens regulatory frameworks and affects ecosystems. Furthermore, the development has been unable to reduce significantly poverty and misery. On the contrary, it seems to constantly reproduce new forms.
Hence, several questions arise to underline the problematic of this article: Is economic growth alone responsible for the damage brought to the environment? What about developing countries? How reducing inequalities of income in such economies can legitimize sustainable development on a large scale? Can we go beyond the quality indicators? Could we build a model of ecological sustainability from a more comprehensive indicator for qualitative progress? What about Egypt and Lebanon?
To answer these questions, our objective is to rely on ecological models to build a new indicator of sustainable development: an Indicator for Qualitative Progress (IQP). First, the indicator will draw an interpretation of social inequalities especially those of income inequality. Second it will measure the degree of pollution in order to find remedies to these two problems, therefore proving their interrelation by construction. Thirdly the model of reducing pollution through the channel of reducing income inequalities will be completed by a test towards the Kuznets curve for Egypt and Lebanon.
Results show that the new indicator (IQP) confirms the relationship between social well-being and environmental one as it explains that sustainable development – human and economic developments - should assure equality in income distribution and preservation of the environment natural resources such as water and forests. And if these two are guaranteed, we could read a

progress in human development indicators. For policy orientations in developing countries, results also show that in Egypt and Lebanon, governments have to drive economic growth into achieving not only increases in the GDP per capita, but also into a quality growth through reduction of poverty, income equity and accessibility to resources. Through that, the second phases of development are reached - as instructed in the Kuznets curve - and the reduction of pollution is accomplished.

Keywords: Environment, economy, responsibility, sustainability, inequalities, indicator, qualitative progress, social well-being.

1. INTRODUCTION

Interest in the concept of development is not new. Certainly, the issue of development involved economists since the 19th century. But the sustainability of development has boomed when becoming the subject of multidisciplinary research during the last decade. If the development has been confused with the increasing net per capita production, sustainability redefines the relationship between development and growth. However, growth remains a challenge for developing economies.
The concept of sustainability dates back to the early 1980s. It is designed as a new global goal for most international institutions. Their main concern turns around two major issues: the persistence of poverty and the dramatic increase in inequality in developing countries.
In poor countries, sustainable development highlights the fight against inequality and poverty (Harribey, 2009). In addition, growth must be conducted along two major principles: reducing inequality and enhancing economic growth to meet the requirements of sustainable development. In other words, it is a growth that takes into account the human element in all dimensions: economic, social and ethical. It should reduce the imbalances in space - intra generational ones especially between the North and the South - and those in time or intergenerational.
In this context, efforts have been made in social development since the World Summit for Social Development in Copenhagen in 1995 and Johannesburg in 2002. But the results are controversial because of the persistence of poverty in all its forms: poverty, insecurity and high unemployment. Faced with this phenomenon, indicators of social sustainability allow us to test the reliability of the Kuznets hypothesis establishing the link between social inequality and economic growth. The Kuznets hypothesis considers the increase in income inequality as temporary in the development process: Inequality should decrease as the development level increases (Stern, 2003). Divergent realities in different countries lead to rethink the Kuznets relationship. It would be interesting to study countries like Egypt and Lebanon to understand the impact of growth on inequality and sustainability. Such case studies are needed to make a diagnosis of pollution and social inequalities.
The problem we propose to answer here is what would be the interactions between economic, social and environmental sustainability in Lebanon and Egypt, two developing countries facing time of crisis and emerging in vulnerability. Our work has two parts. In the first part we present a theoretical review on sustainable growth. In a second one, we will highlight the role of social and economic sustainability in reducing inequality and assuring environmental relief in Egypt and Lebanon.

2. A THEORETICAL REVIEW ON SUSTAINABLE GROWTH

2.1 Theories relating Economic growth to Environment

Many theoretical analyses have already indicated and demonstrated the negative relationship between economic development and degradation of environment and ecosystems.
A brief review of theories that promotes economic development will be presented before understanding sustainability, theories that explain the relationship between economic growth and the environment:

- First and until the industrial revolution, economic growth was tied to the growth of agricultural production, and often seen as the only indicator of economic well-being: the business cycle expansion depends on the natural cycle expansion and good harvests.
- Then the demographic factor was integrated in the literature in order to define the "economic growth per head" and understand the evolution of production in terms of a change in the standard of living. Thus, in developed countries, protection of the environment is attached to the mastery of pollution. In developing countries, it is attached to a mastery of population growth.
- Third, the environment and natural resources were included as main predictors of economic growth in endogenous models, as a production factor and as a natural capital.

If theories we have presented appear to support growth, still they remain controversial because of the role occupied by many other important factors contributing to growth such as physical capital, technological progress and capital intensity.
Furthermore, in 1995, Grossman and Krueger examined the relationship between per capita income and four environmental indicators: urban air pollution, the state of the oxygen in river basins, fecal contamination of river basins, and contamination of river basins by heavy metals. They find no indication that environmental quality deteriorates economic growth. But for most indicators, economic growth brings a primary phase of deterioration followed by a phase of improvement.
In 2003, Brock and Taylor emphasized that the relationship between economic growth and the environment is not well understood because of limited perception of the basic science implicated and very limited data. Because of these difficulties they developed a relatively simple theoretical model, the "Kindergarten rule" of sustainable growth that generates specific estimations. They explained that if societies could implement zero emission technologies in either finite time or asymptotically, new predictions linking environmental quality to growth can be provided.
Many other researches were done in order to define an explicit relationship between environment and growth. And most of them relied on the environmental Kuznets model, essentially rearranged to fit the environmental relief: the Kuznets hypothesis (1955) relating growth to inequalities through the Gini coefficient.
What is the Kuznets curve and how it integrated pollution instead of inequalities?

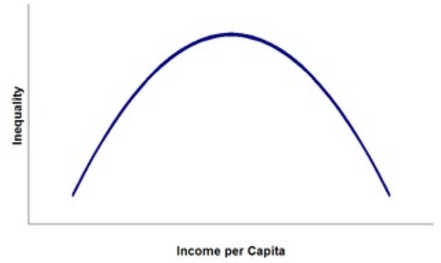
2.2 .Theories relating Economic growth to Environment

Nowadays, a substantial literature exists on the relationship between income inequalities and economic growth. Analysis of the effects of growth and income distribution on living standards has concerned different economic trends: According to Aghion, Caroli and García-Peñalosa (1999), development has proved to be unable to regulate social relations and reduce poverty and inequality in developing countries. They explained that in market economies, the relationship between inequality and the process of economic development is positive. In fact, inequality is good for incentives and therefore good for growth even though incentive and growth considerations might sometimes be traded off against equity. But in developing economies, as Michael Todaro (2011) explained in his book *Economic Development*, greater equality may in fact insure sustainable economic growth, given four different arguments. And recently, a number of empirical studies often based on cross-country regressions of GDP growth on income inequality proved a negative correlation between a number of measures of inequality and the average rate of growth (Bénabou, 1996).
Nevertheless, the traditional theory establishes a direct link between economic growth and standard of living. The first hypothesis developed by Kuznets (1955) indicated that the correlation between GDP/capita and inequality is an inverted U-curve.

2.2.a The Kuznets model: from inequality to growth, a transition from an agricultural economy to an industrial one

Kuznets (1995) was based on the idea that there is one case relating income inequality to growth. From the analysis of the historical evolution of inequality during the industrialization of Germany and the United Kingdom throughout the first half of the twentieth century, Kuznets proposed a general rule that determines the link between growth and inequality as an inverted U-curve (figure 1) - where the X axis is the GDP per capita and the Y axis is inequalities represented by the Gini coefficient. According to this curve, the weakness of the GDP per capita is reflected in the early stages of development. Similarly, inequalities increases further until the country reaches a certain level of development. At this specific level of development, inequalities stabilize then decline.

Figure 1. A Kuznets curve



Source: http://en.wikipedia.org/wiki/Economic_inequality

This inverted U-curve explicit the idea that the process of economic development reflects a transition from an agricultural-low productive economy to an industrial-high productive one. Kuznets explained this principle when considering dualism in two different productive sectors: two agricultural sectors and two non-agriculture sectors, very unequal. Under this assumption, changes in inequality, during this period, are attributed to the reduction of the share of the traditional low-productive agricultural sector in the economy and its replacement by the industrial sector. This relationship seems to have been verified during the period 1960-1970 but is currently being challenged because of the nature of many countries.

2.2.b. The Kuznets hypothesis criticized: in developing countries, growth increases inequalities.

Many empirical studies have focused on the analysis of the Kuznets model from cross-country data (Deininger & Squire, 1998), analysis that rejected the Kuznets hypothesis in 90% of cases. Over the past decades, interest in development is to integrate inequalities in socio-economic assessment of poverty. Analyses have shown that inequalities cannot be reduced in situations of economic growth. Therefore, the issue is the relationship between inequality and growth.
Current conventional thinking about the dynamics of development considers that economic growth may increase income (reduce poverty) but effects on income distribution (increasing or decreasing inequalities) are still vague. The Kuznets hypothesis explains this systematic link and positive relationship between economic growth and income distribution. Given the inverted U-curve of Kuznets, the share of the poor in the distribution of the fruits of growth tends to decline in the early stages of development and increases on the long term.
A good policy would be to accelerate economic growth through an industrialization proactive policy that would faster the stages of development. It is explained that in poor countries growth increases inequalities while it reduces them in high-income countries. Most empirical studies confirm that the process of development is not limited to the growth rate but to the growth nature, fair or unfair (Burgenmeir, 2003). Thus, growth can determine the degree of inequality.

2.2.c. *Kuznets model transposed: the integration of environment and the environmental Kuznets curve.*

One of the main theoretical models that relate growth to pollution is the Kuznets curve, a curve that supports a non-interventionist approach in the environmental field. It explains that technical progress may provide transition from growth to a cure polluting growth for the environment if the market is left alone. This curve have been implemented in the environmental field (Grossman & Krueger, 1995) to understand the relationship between growth and pollution: “pollution” as a factor attached to economic growth replaces the factor “social inequality” or inequalities in the distribution of income and wealth. Thus, it was enough to replace the statistical indicator of social inequalities by an indicator of pollution on the Y axis of the curve and keep the X axis for the evolution of the production per head Q/L which indicates a certain level of economic growth.
Empirical evidence on the evolution of inequality in the United States have shown that economic growth is a powerful factor in reducing social inequalities, but certainly not in the first phase. At the beginning, inequalities increase and then decrease to reach the poorest and be felt at all social levels. However, this link, if it exists, is not general. It is especially challenging in developing countries. Thus, by analogy, the Kuznets curve suggested two links or opinions on the relationship between pollution and economic growth:

– For some, economic growth contributes first to pollution, but reaches a second phase where pollution is cut and the technical progress suits long-term growth.
– For others, growth can increase the degradation of the environment because technological progress alone cannot solve this problem: the economy is not a moral science (Daly, 1997).

2.2.d. An empirical review on the environmental Kuznets curve.

In order to understand some of the empirical tests presented in the literature and analyze the relationship between growth and pollution, an empirical review on the Environmental Kuznets curve will be examined:
In their paper, Cole and Rayner (1997) examined the relationship between per capita income and a wide range of environmental indicators using cross-country panel sets. Results suggest that meaningful environmental Kuznets curve exist only for local air pollutants. Two other conclusions are also given: that concentration of local pollutants in urban areas peak at a lower per capita income level than total emissions per capita; and that transport-generated local air pollutants peak at a higher per capita income level than total emissions per capita. Given these findings, they made recommendations concerning the future direction of environmental policy.
An another point of view, that of McConnell (1997) showed the environmental Kuznets curve as an empirical regularity and how some pollutants increase and then decrease with growing per capita incomes. They also stressed on the fact that popular discussions and models of the environmental Kuznets curve emphasize the role of the income elasticity of demand for environmental quality as a driving force for the inverted U-shaped relationship between income and pollutants. Their paper explored the role of the income elasticity of demand for environmental quality. They found that increasing pollution may occur with increasing income and decreasing pollution may occur simultaneously with preference to pollution reduction as incomes rise.
Other previous studies on the relation between pollution and income have tried to analyze cross-sectional or panel data for a sample of developing and developed countries. The paper of Jeffrey (1997) presented an analysis for a single country, Malaysia. The author found that pollution-income relationships failed to predict precisely trends in air and water pollution in this country. In particular, none of six pollution-income relationships estimated using a panel data set for Malaysian states has the hypothesized 'environmental Kuznets curve' form. This result confirmed the importance of policy decisions in determining environmental outcomes in Malaysia.
More interesting is to read the paper of David Stern (2003) in which he chronicled the story of the environmental Kuznets curve, a curve suggesting that indicators of environmental degradation first rise, and then fall with increasing income per capita. However, he proved that the environmental Kuznets curve results have a very delicate statistical foundation. In fact he indicated that recent evidence shows that developing countries are addressing environmental issues, sometimes adopting developed country standards with a short time lag and sometimes performing better than rich countries. He finally proposed a new generation of models that can help sort out the true relations between development and the environment.
Moreover, Brock and Taylor in 2004 demonstrated a key empirical finding in environmental economics: The Environmental Kuznets Curve and the core model of modern macroeconomics, the Solow model, are intimately related. In their new model, which they call the Green Solow model, they generated a relationship between both the flow of pollution emissions and income per capita, and the stock of environmental quality and income per capita. The resulting

Environmental Kuznets Curve may be humbly shaped or strictly declining. They also developed an alternative empirical method closely related to tests of income convergence employed in the macro literature using data from OECD countries.

2.3. Economic growth and International Environmental Governance.

It appears that all practitioners of sustainable development have similar opinion with international institutions showing the growing gap between the continuity of unconstrained growth and the need for a new governance internationally to protect the environment (Figure 2). Thus, the post-war period was characterized, on the one hand, by the international economic reform introduced by Breton woods, and on the other hand, by the awareness for inequality and development generating pollution at all levels.

Figure 2. History of international institutions

1944 Breton Woods' agreements

GATT	IMF	IBRD
General Agreement on Tariffs and Trade	International Monetary Fund	International Bank for Reconstruction and Development
↓	↓	↓
Free Trade in goods	Fixed exchange rate regime	Development

1971 Cancellation of Bretton Woods' agreements

WTO	IMF	
World Trade Organization	International Monetary Found	The World Bank
↓	↓	↓
Free trade in services and intellectual property	Flexible exchange rate Regime	Investment Bank

1986 Growing antagonism

Washington Consensus	Publication of the Brundtland report
↓	↓
Markets growth globally	Implementation of the concept of sustainable development

Source: Beat Burgenmeier, Politiques économiques du développement durable, la Banque mondiale et l'environnement, 2003, p.27.

The Brundtland report raised economic, social, environmental, political and moral issues. This report refused to sacrifice the present generation to future ones. Therefore, achieving sustainability may be perceived independently of a temporal scope. The report recommended the persistence of an economic growth that should change "quality" without breaking with the market economy. With regards to poor countries, the priority is to end underdevelopment by satisfying basic needs. And for that, it is a growth that allows an increase in the income average that is required. This increase will slow population growth, reduce poverty, eliminate injustice and constitute by itself a solution to the major environmental degradation, where the poor are the main victims.

The report also recommended that in rich industrialized countries, economic growth must continue to support developing countries. And the quality of development must change to incorporate the pillars of social and environmental development. Consideration of the environment must be made through a technological shift and protection measures. Technological progress should be used to solve the two major issues facing the environment, resource use and waste production, without overlooking protection of ecosystems and conservation of biodiversity. The report also acknowledged the existence of ultimate limits on material consumption, such as climate change, but do not comment on their implications. It urged for a more egalitarian and socially fair growth for individuals and taking into consideration the common interest for society. Reference to coordination between public policies and private actors is crucial for a suitable performance of markets, but the focus is mainly on international cooperation and global "good governance".

And a question remains without an answer: *how to bring developing countries and growth patterns to meet with the criteria of sustainability?*

2.3.a. Inequality and social sustainability of development.

The Brundtland report defined sustainable development as "development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs" (WCED 1989)[1]. Therefore, sustainable development has three objectives: improving current living conditions, respecting intra and intergenerational equity and assuring the environmental efficiency side of economic development. The main purpose of economic sustainability is to optimize the economic growth in terms of trade and competitiveness without causing debt burdens on future generations.

The environmental dimension of sustainability is to conserve natural resources for future generations. It focuses on the fight against pollution and the conservation of non-renewable resources.

The social sustainability, as an essential component of human development, is to better transmit the human and social capital for future generations in order to preserve the human dignity. It is expressed in the fight against poverty and social exclusion (Ballet, Dubois & Mathieu, 2004). It implies a better transmission of factors to a long-term growth for the next generation. Consequently, how to reconcile environmental and social sustainability in developing countries? In poor countries, at the microeconomic level, the non-respect of intra-generational equity increased risks of disorder and social obstacles. For example, the political fight against poverty

[1] The World Commission on Environment and Development, 1989.

targets a particular social group, thus undermining the security of other social groups, even threatening social cohesion.
Similarly on the macroeconomic level, the development of individual capacities is built at the expense of equity within the same generation. Undoubtedly, political growth that aims to promote sustainability can reveal a malfunction by increasing social inequalities and unequal capacity[2] transmission from one generation to another in these countries. In this case, women and children will be the first victims of insecurity, poverty and inaccessibility or social exclusion. There are therefore many examples of risk and unfair transmission capacity from one generation to another.

2.3.b. Human Development Indicators and sustainable development.

Both in the works of environmental economy and human development, proposals have emerged to describe different human activities and their positive and negative impacts on the well-being of individuals. They can gather around two references: the sustainable national product that is particularly expressed in the formula of green GDP and the Human Development Index (HDI). The latter was proposed in 1990 by the UNDP (United Nations Development Program) as a synthetic indicator to measure progress towards sustainable human development. However, this indicator has been the subject of many critiques because of its false universality, its calculation methodology that does not include any environmental indicator, the several methods proposed to apprehend it and the Western conception of social indicators that hardly considers environmental progress in developing countries based on social progress of life and education. So basically, the standard of development chosen in this indicator needed to be rethought.
Today, the Human Development Report Office (HDRO)[3] is trying to work on a new indicator, a sustainable Human Development Index (S-HDI) that could insure human well being (HWB), environmental well-being (EWB) and economic well-being (EWB). Meeting these three objectives is crucial because what ultimately matters is using national income "to give all people a chance to live a longer, healthier and a more productive life" (Ban ki-moon, 2013). While the classic current HDI comprises in its calculation, life expectancy, education (mean years of schooling or expected years of schooling) and income (Gross National Income per capita or the PPP); the S-HDI is supposed to be an extension to the HDI including additionally CO_2 emissions, water consumption, land area, ecological footprint; biodiversity and adjusted net savings[4].
Hence, *what would be a closer proposition to the S-HDI in developing countries? Could we build a model of ecological and social sustainability from a more accurate indicator of qualitative progress? Could we assure consequently environmental well-being as well as economic and social ones?* And *what about Egypt and Lebanon for instance, two developing countries where inequality, environmental stress and social tensions are urging for policy interventions?*

[2] Ballet J., Dubois J.L. et Mathieu F., "The social sustainable development: a way to integrate capacity and sustainability", September 2003, 3rd Conference on the Capacity Approach at the University of Pavia.
[3] On 28-29 January 2013, a HDRO workshop was held in Paris, to discuss whether and how to include the issue of sustainability into the HDI. The HDRO is an editorially autonomous publication commissioned by the UNDP.
[4] This is certainly not the complete list. During the workshop other indicators have been mentioned: Inequality (expressed by income distribution) and employment. And other new indicators might be proposed and announced.

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

3. MODELING SUSTAINABLE GROWTH FOR EGYPT AND LEBANON

3.1 Three forms of economic modeling for sustainability.

The formulation of the concept of sustainable development is conciliation between different economic models. The most common are:

a) *Efficient Market Economy* (Smith, 1776): This model explains that any environmental problem can be solved by technical progress in the context of competitive markets. Thus, any environmental problem alters the relative prices formed on the markets, and then encourages economic actors to change their behaviour as consumers adjust their purchases according to the change in relative prices and producers adopt their share of new production technologies. The implication for economic policy is simple: given the problems of environmental degradation, simply let the market resolve it.

b) *Environmental Economics* (Pigou, 1920): This model adds that if environmental problems can be solved by the market, it is necessary to make corrections to its operation. Thus, the market could be faulty, and the government must act as an incentive. The implication for economic policy consists in introducing market-based instruments such as environmental taxes and property rights in the flora and fauna.

c) *Ecological Economics* (Costanza *et al*., 1991): This model emphasizes that it is the environment that determines economic activities. So economists must incorporate natural constraints in modelling them. The implication for economic policy is that the reference to statistical measures of economic growth should be replaced by indicators of sustainable development.

In our practical contribution, we rely on the latter ecological model to build a new indicator of sustainable development: an indicator of qualitative progress (IQP). This indicator is derived from the criticism and discussion of the limitations of human development indicators as we showed in the first part.

3.2 Modeling ecological and social sustainability in Egypt and Lebanon.

During the last decade, vulnerability and inequality increased in many countries, creating social tensions and often political disorder.

3.2.a Environmental Challenges and High Social Inequalities in Egypt and Lebanon

Today, Egypt like other developing countries is facing a basic problem: the population growth rate is higher and faster than the developing rate of infrastructure or social services and the productivity growth rate remains very low. Furthermore, a major problem arises from unemployment and lack of water resources to improve the quality of life and get better opportunities: it is the rural urban transfer[5] of Egyptian population that is estimated to double in 2015[6]. Regional inequality[7] in income and living standards and urban dominance are associated

[5] Many citizens in Egyptian cities and communities are living under this kind of deficient, unhealthy and unsustainable condition: Shortage of available housing, inadequate mobility and chaotic traffic, air pollution, insufficient service infrastructure, etc.
[6] United Nations Population Division of the Department of Economic and Social Affairs (2003).

with environmental degradation and poverty. These severe cumulative problems cannot be solved with traditional policies: an urgent plan of ecological and social sustainability is pushing forward all researchers and practitioners to act immediately.
Hence, the future-oriented solution for the government and non-governmental organizations has been since 2001 the pursuit of Sustainable Development[8] for a quality future and sustainable cities.
Lebanon's path towards sustainable development is disrupted since 1992 by external and internal, political and social factors. Instead of heading toward sustainability and growth patterns, the country was in deep need for reconstruction and emergency responses for poverty issues and rising inequalities. Still, the country needs a comprehensive approach for building institutions, developing infrastructure and reducing regional and income disparities[9], and more to be engaged in poverty alleviation and social development. Hence, as we notice, it is not about any advancement in ecological or social sustainability but in renewing the political commitment to sustainability that is required[10].

3.2.b. Methodology and results analysis: Proposing an Indicator for Qualitative Progress

The criticism of the HDI does not form a hypothesis to reject quantitative indicators, always depending on the model that underlies them. But the need for a qualitative indicator as the S-HDI is crucial to define and distinguish the desirable effects of integrating social and ecological development to development itself. Hence, first we will propose an indicator of qualitative progress - the IQP - and measure it for Egypt and Lebanon. And second, we will complete the construction of this indicator by a test towards the Kuznets curve to notice the relationship between growth and pollution in these two countries.
The IQP has to suits the following conditions: On the one hand, it should integrate a new social indicator different from the cultural one that exists in the measurement of the HDI: the social cohesion indicator which is the indicator of income inequalities that is proposed in the S-HDI. In addition, social progress is a result of economic growth and will be shown in the construction of the IQP in four different measurements: the alleviation of the illiteracy rate; the development of the enrollment rate; the development of the activity rate of the labor force; and in the reduction of disparities of income between the richest and the poorest. In fact, social equity and the assurance of income equality can help in reducing pollution not in the first phases of development but at a later phase when the benefits of economic growth (measured by the GDP per capita) are spread evenly to all citizens (OECD, 2008). Therefore, poverty, inequality and inaccessibility are attached to environmental degradation because "Unsustainable development has degraded and polluted the environment in such a way that it acts now as the major constraint followed by social inequity that limits the implementation of perpetual growth[11]."

[7] The urban population in Egypt is not evenly distributed among the 219 cities in which they live; Egypt's two primary cities Cairo and Alexandria comprise 43 percent of the total urban population (17 percent of the total population of Egypt) while 77 cities comprise 4 percent of the urban population.
[8] The Abu Dhabi Declaration: Perspective of Arab Environmental Action (2001).
[9] Beirut is shifting 43% of the rural population in 2013 for unemployment reasons and income inequality within the same sector remains between the jobs offered in the city and those in other regions.
[10] Lebanon recognizes the need to promote a public debate on what constitutes a green economy and how to achieve it (ESCWA/UNEP/LAS, 2011).
[11] Emil Salim, *Institutionalising Sustainable Development*

On the other hand, the IQP should measure sustainability as a question of intergenerational equity where economic, environmental and social resources are utilized and distributed fairly across generations. Therefore, the IQP must meet the new measurements' recommendations of the United Nations' referred office for human development in order to better read sustainability as leading development and growth to a balanced society and nature.

3.2.c. Construction

The principles of construction are:

- The same indicator can measure both economic and social wealth;
- The indicator measures life conditions in figures, in order to integrate the quality of human relations, conditions of life, clean air and water, etc. The IQP must also follow the principles of responsibility and solidarity within and between generations;
- The indicator also corroborates the principle of economy without reference to an aggregate production or national income such as GDP.

Our indicator is composed of four sub-indicators. Each of these indicators can be composite if the necessary information is available. And every indicator meets one or more of the three principles outlined above.

3.2.d. Application

Indicators for Lebanon are:

1) The cultural indicator (I_c) is equal to the weighted average[12] of the adult literacy rate and enrollment of young adults from 6 to 23 years:
The average literacy rate (R_L) is 88.3 %, with 93% for men in average and 83.6 % for women in average between 2005 and 2011.
The average enrollment rate (R_E) is 88.5 % between 2005 and 2011. Indeed, we will retain the average rate of school attendance (97 %), the total literacy rate of young people between 15 and 24 years (94%), enrollment rates in primary education (77%) and enrollment rates in secondary education (86%)[13]. These rates are well correlated with the economic development, and we choose them in preference to the life expectancy integrated in the HDI because of their higher universalism. In addition, we do not take into account an indicator of health because of its dependence on health spending and particular modes of life:

$$I_c = (2R_L + R_E) / 3 = (88.3\% + 88.5\%) /3 = 88,36\%$$

[12] We will retain the weight of the HDI of UNDP: 2 and 1 respectively.
[13] In Lebanon between 2005 and 2011 according to The Middle East Institute, UNESCO (EFA Global Monitoring Report 2008), UNICEF statistics Brief Lebanon, the World Bank (The World Development Indicators database, September 2008).

2) An *environmental indicator* (I_e)[14]: we could choose either the level of preservation of the water[15] quality either that of air, or the rate of preservation of forest in Lebanon. For reasons of data availability, we believe that this indicator is the simple arithmetic average of the rate of preservation of water resources and the rate of forest conservation.

The rate of preservation of water resources[16] (R_W) is the complement to a waste and annual consumption rate (1 – water waste rate and annual consumption) which is equal to 0.127 or 12.7%. .

The rate of forests' conservation (R_F) with10.200 hectares of trees[17] and 139.376 hectares in smoke, the indicator shows an average from 2002 to 2011 equal to 12.25 %[18]:

$$I_e = R_W + R_F / 2 = (12.7\ \% + 12.25\%) / 2 = 12.475\ \%$$

3) *An indicator of activity* (I_a) which is the arithmetic average of the proportion of free time compared to the total time available (the complement to 1 of awake time spent working that equals 10.4 hours per day) and the proportion of the labor force (the complement to 1 of the unemployment rate) .

The proportion of free time compared to the total time (P_F) is equal to 1 - (13[19] / 24) = 45.833%

The proportion of the labor force is the proportion of workers (P_W): it is equal to 1 – (the estimated unemployment rate for 2011) = 1-8.98[20] % = 91.07%:

$$I_a = (P_F + / P_W) / 2 = (45.833\ \% + 91.07\%) / 2 = 68.4515\%$$

4) *An indicator of social cohesion* (I_{sc}) which is the arithmetic average between the ratio of the share of the national income received by the fifth – the 20% - of the poorest part of the

[14] Different from the Environmental performance Index (EPI) that indicates, according to the University of Yale's in 2012, that Lebanon scored 47.35% and ranked 94 among 132 listed countries. The index is based on 25 performance indicators tracking three policy categories: environmental, public health and ecosystem vitality.

[15] Available water, defined as "present renewable resources per capita," is just over 1,100m3/capita/year, dangerously near the international benchmark of 1,000m3/capita/year. Falling below this benchmark would indicate water resources stress (WB, 2009).

[16] Excessive and uncontrolled groundwater pumping in coastal cities has led to seawater intrusion, often irreversible. Despite significant investment in the water distribution infrastructure, around 50% of the transmission and distribution pipelines still require special attention (leakages, corrosions, etc.) (Ministry of Energy and Water: MOEW, 2010).
Wastewater generation from households (estimated at 249 Mm3/year – WB, 2011a) and industries (60 Mm3, MOEW, 2010) are affecting the quality of groundwater resources almost everywhere in Lebanon.

[17] The National Forest Assessment program estimated the % of forests and other wooded lands respectively to 13.3% and 10.4% in 2011 of the total area of Lebanon.

[18] MOE/NCSR, 2002 (published) and NCSR, 2011 (unpublished)

[19] According to the Global statistics of Sherbrook University.

[20] We note that the global statistics from the University of Sherbrook publish an unemployment rate of 8.08 % in 2004 and 9.2% in 2007 and 10.7 % in 2011.

population[21] represented by *the ratio of income of the poorest to GDP*[22] (R_P) and the share of the national income received by the fifth of the richest part of the population represented by the *ratio of income of the richest to GDP*[23] (R_R).

Note that in Lebanon equivalent income for the poorest is estimated to $ 200 per month and considered as received as a substantial income, 7.7% of the national income and wealth. Similarly, the portion of the national income received by the quintile of the richest people is approximately 28.9%:

$$I_{sc} = (R_P + R_R) / 2 = 18.3\%$$

Given the four indicators, the *Indicator for Quality Progress* (IQP) for Lebanon will be equal to the arithmetic average of the four sub-indicators:

$$IPQ = (I_c + I_e + I_a + I_{sc}) / 4 = (88.36\% + 12.475\% + 68.4715\% + 18.3\%) / 4 = 46.903\%.$$

IPQ without environment = 58.38%.

Indicators for Egypt are:

1) The *cultural indicator* (I_c) is equal to the weighted average of the adult literacy rate and enrollment of young adults from 6 to 23 years also:

The average literacy rate (R_L) is 87.5 %, with 90% for men in average and 85 % for women in average from 2005 to 2011[24].

The average enrollment rate (R_E) is 83.25% in 2011. We will retain the average rate of school attendance (92%), the total literacy rate of young people between 15 and 24 years (93%), enrollment rates in primary education (70%) and enrollment rates in secondary education (78%)[25].

$$I_c = (2\ R_L + R_E) / 3 = (2 * 83.25\% + 87.5\%) /3 = 84.67\%$$

2) An *environmental indicator* (I_e): The National Water Research Center in Egypt published in the Water Science Journal[26] assessments on water quality and figures on annual optimum utilization of water[27] and its effective transport.

The rate of preservation of water resources[28] (R_W) is the complement to a waste and annual

[21] While the assessment of poverty is a very complex matter, preliminary poverty calculations on the basis of the Living Conditions Index have revealed that in 2004, an estimated 5% of the households live in extreme poverty (as compared to 7% in 1995) and 19% of households live in relative poverty (28% in 1995).

[22] The government of Lebanon is currently implementing a $28 million National Poverty Targeting Program to provide direct support to the neediest (PCM, 2012). Launched in 2009, the program uses proxy indicators to assess the income of 91,000 poor families living in poverty pockets across the country.

[23] GDP for Lebanon is 42.95 billion of dollars for the year 2012; GDP per capita is 9,705.39 USD for the same year.

[24] Ministry Of Education, Statistic and Educational Indictors for the annual years 2005-2011: (www.emoe.org).

[25] We follow the same simplification as for Lebanese calculations.

[26] Issue number 037 to Issue number 052: from October 2005 till October 2011.

[27] Egypt depends on three main sources; the River Nile water, rain fall and floods in addition to ground water.

consumption rate (1 – water waste rate and annual consumption) which is equal to 0.473 or 47.3%.
The rate of forests' conservation (R_F)[29] is dependant o the rate of cultivated forest areas in 2005 equal to 13.500 feddan and the amount of wastewater treated in new cultivated forest areas:

$$I_e = R_W + R_F / 2 = (47.3\% + 18.5\%) / 2 = 32.9\ \%$$

3) *An indicator of activity* (I_a) : this indicator also shows the arithmetic average of the proportion of free time compared to the total time available (the complement to 1 of awake time spent working that equals an average of 13 hours per day) and the proportion of the labor force (the complement to 1 of the unemployment rate) .
The proportion of free time compared to the total time (P_F) is equal to 1 - (10/ 24) = 58.333%
The proportion of the labor force is the proportion of workers (P_W): it is equal to 1 – (the estimated unemployment rate is 12.4%[30]) = 1-12.4% = 87.6%:

$$I_a = (P_F + / P_W) / 2 = (58.833\ \% + 87.6\%) / 2 = 72.966\%$$

4) *An indicator of social cohesion* (I_{sc}) which is also the arithmetic average between the ratio of the share of the national income received by the fifth – the 20% - of the poorest part of the population represented by *the ratio of income of the poorest to GDP* (R_P) that equals 5.021% of the total GDP and the share of the national income received by the fifth of the richest part of the population represented by the *ratio of income of the richest to GDP*[31] (R_R), that equals 22.235%.

Note that the annual income of the poorest 20% of the Egyptian population increased for 200$ only[32] and those in the top 1% of the population enjoyed an increase of 225%. Those in the middle fifth saw a rise of just 2400 USD.

$$I_{sc} = (R_P + R_R) / 2 = 13.628\%$$

Given the four indicators, the Indicator for Quality Progress (IQP) for Egypt will be equal to the arithmetic average of the four sub-indicators:

$$IPQ = (I_c + I_e + I_a + I_{sc}) / 4 = 51.041\%$$

IPQ without environment = 57.088%

[28] In terms of Fresh water quality and Coastal water quality. This indicator is calculated as the average of many indicators taken from 2005 to 2008: Chemical Oxygen Demand Concentration (COD) in the River Nile, its branches and main canals; the Total Nitrogen Concentration (TNC) in the Egyptian Red sea and the Mediterranean sea coastal waters; the Total Phosphorus Concentration (TNC) in the Egyptian Red sea and the Mediterranean sea coastal waters.
[29] We rely on the indicator of Afforestation: Total Forest Area in Egypt counts for 0.14% of its total inhabited land area. The indicator of total forest area measures areas planted with forest trees and its relation with the amount of treated sewage water used according to the pertinent Egyptian code (for the year 2005 only).
[30] Today Egypt has the highest rate of its unemployment rate equal to 13.3%.
[31] 257.3 billion Of dollars is the GDP for Egypt for the year 2012; GDP per capita is 3,187.31 USD for the same year.
[32] The income gap and the Egyptian revolution are associated with this severe rising in annual income inequalities.

4. RESULTS ANALYSIS

We can conclude two important things when calculating and measuring the IQP for the selected two countries:

- ***Comparing HDI to S-HDI to IQP****:* when comparing the HDI measured by the UNDP from 2005 to 2011, our index is far from matching or equalizing the latter prediction. In fact for Lebanon, for instance, the HDI for 2005 is 0.714 (71.4%) and that of the year 2011 is 0.744 or 74.4%. For Egypt, on the other hand, the HDI equals 0.625 for the year 2005 and goes to 0.661 in 2011. So as we notice, if we look at the indicators included in the HDI- indicators of Health, Education and Income – Environment and Social indicators are not included. Furthermore, this difference is due to the negative effects of environmental damages and social non-cohesion in both countries. Also unemployment and inequalities are shown in the IQP but not in the HDI. This difference would rather be mitigated if we had isolated the environmental indicator as the figures shows. What happens also if we segregate the IQP from the social solidarity indicator (social cohesion)? The result will also show a lesser difference with the IQP and other indicators.
- ***Economic well-being, Environmental well-being and Social well-being***: in reference to the first part and to the recommendations of the Brundtland report, the IQP shows us that national environmental governance and economic growth are intimately related to inequality reduction, poverty alleviation and social cohesion. If the EWB, EWB and SWB are interconnected in the construction of the indicator in itself, they also confirm one decisive conclusion for policy orientations in developing countries: governments have to acknowledge and try their best not only to restore institutions and establish new infrastructure but also to guide economic growth into achieving environment and human development. And that could be expressed by the rules of social cohesion, solidarity and the respect for the environment. Consequently, the IQP is a composite indicator that measures and links better Economic development, Responsibility and Solidarity towards environment. These could be the three components for a long-lasting sustainable development, specifically in developing countries.

4.1 Towards the Kuznets curve for Lebanon and Egypt: an extension for modeling environmental relief.

Returning to the Kuznets' curve, let us observe the relationship between Pollution (on the Y axis) and GDP per capita (on the X axis) for both countries:

Regarding the Kuznets curve for Lebanon: Presenting an indicator for pollution for Lebanon could be a tough matter because there is no specified environmental indicator determining pollution for the country. In fact the only available indicator for pollution is the Water pollution in terms of BOD levels (see appendix figure 7): The BOD is a commonly used environmental performance indicator that determines the level of concentration of biodegradable impurities in water bodies, for example those introduced by sewage flows (Assaf & Saadeh, 2008). This indicator is estimated for the years 1998-2008 in the tables 1 and 2. As we notice, shapes of both lines (figure 3 and figure 4) show a decrease of the GDP per capita and an increase in Water pollution for Lebanon: results suggest that no meaningful environmental Kuznets curve exists for local water pollutants (figure 5). Two other conclusions could be given: on the short run, as the GDP per capita rises, water pollutants fall. On the long run, income per capita decreases and

water pollutants increase. In fact, the environmental Kuznets curve results for Lebanon have a very delicate statistical foundation (Stern, 2003).

Table 1. BOD levels and Water pollution or K_d (BOD decomposition rate.

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0.62	0.45	0.40	0.60	0.50	0.71	0.72	1.00	1.35	1.40	1.90

Source: http://www.weap21.org/downloads/WQLitani.pdf (H. Assaf, M. Saadeh / Environmental Modelling & Software 23 (2008) 1327–1337: page 1332).

Table 2. GDP per capita.

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
5616.1	5778.1	5674.1	5610.5	5620.0	5548.5	5457.3	5616.6	5483.1	5390.4	5710.7

Source: http://www.tradingeconomics.com/lebanon/gdp-per-capita

Figure 3. GDP per Capita is decreasing on the long term in Lebanon

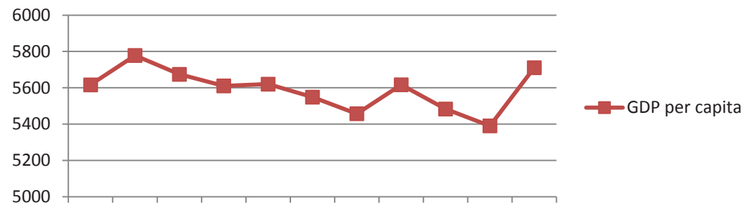


Figure 4. Water pollution is increasing on the long term in Lebanon.

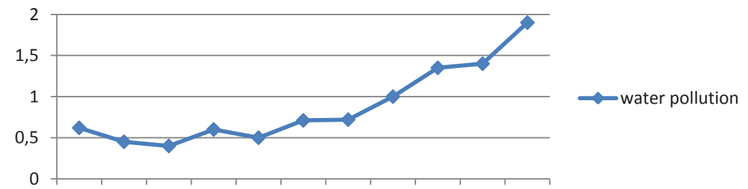
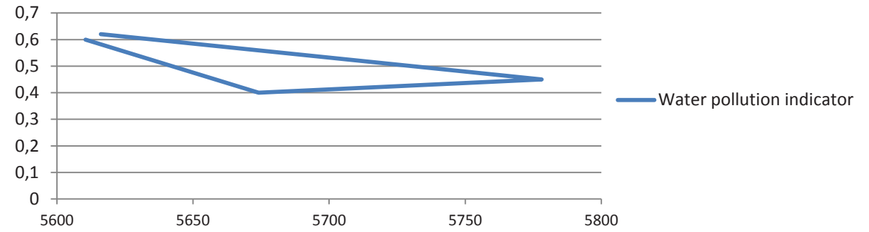


Figure 5. The Kuznet Curve shape for Lebanon.



Regarding the Kuznets curve for Egypt: The Water pollution indicator for Egypt to be selected is the Chemical Oxygen Demand COD that reflects changes in organic concentrations in water due to the effects of industrial and municipal wastewater. It describes states of fresh water quality in Egypt which the main source is the Nile River. We will calculate in table 3 the average for COD averages in the 11th governorates of the Republic Arab of Egypt that are stated in the annual report for 2008 (see appendix figure 8).

Table 3. COD averages from 1997 to 2006 (mg/l)

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
23.73	16.85	13.83	14.35	12.90	13.48	12.61	11.15	10.96	11.35

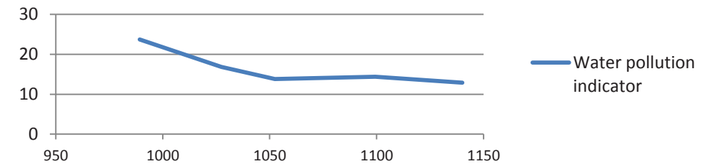
Source: Annual Guide for Environmental Data and Indictors, Ministry of the Environment, Land and Sea, Egyptian Environmental Affairs Agency, Issues 2008, page 65.

Table 4. GDP per capita

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
989.2	1027.4	1052.4	1099.3	1140.1	1161.6	1170.0	1187.8	1216.1	1249.5

Source: http://www.tradingeconomics.com/egypt/gdp-per-capita

Figure 6. The Kuznets Curve shape for Egypt



A very different conclusion for Water pollutants estimates of fresh water quality are made by looking to the Kuznets curve shape for Egypt (figure 6): the relation between GDP per capita and COD emissions is a reverse relation: as the income per capita rises on the long run, total emissions are falling. However, the shape of the Kuznets curve is not an inverse U-curve. The relationship we found does not prove that in the first phases of "growth", pollution rises and then in the second phases it declines. Simply to say that efforts made in reducing the total emissions of COD in waters of the Nile were huge as a first step towards water quality management.

5. LIMITS AND FURTHER DEVELOPMENT OF THE RESEARCH.

The IQP has been calculated depending on two environmental indicators: the rate of preservation of water resources and the rate of forests' conservation. Hence, measurements of environmental development could be improved by including indicators for Air pollution and Land management in the IQP for both countries[33].

Another limit to the IQP is that measurements have been applied only to Egypt and Lebanon. In fact we needed to draw attention to a major problem in these two countries, for the fact that development problems arising are not related to economic growth or to the increase of the GDP per capita but in the way of governing and leading this growth. Thus, will the application of the IQP to other developing show the same results and orientations?

One more question arises: are efforts to researches and consideration shown today in 2013 to the construction of the S-HDI (that has inspired us) will adopt the same direction of the IQP? Would the IPQ be a better indicator for poverty and pollution reduction?

6. CONCLUSIONS

Problems arising from economic development, those of unemployment and ecosystem degradation, cannot be solved without sustainable development. This paper summarizes sustainability conceived as a matter of distribution of scarce resources – like Water resources - between generations and within the same generation. Instead of conditioning economic growth limitation, it is possible to take advantage of it by creating a dynamic transformation and improvement of well-beings for qualitative growth.

This study has demonstrated in two different applications that economic growth is not a sustainable one when it is left alone to the market as Smith (1776) pointed out to. Nevertheless, economic growth has to be driven to a sustainable one through assuring equality in income distribution, equality in accessibility of natural resources. Through that, we can find another phase of development: human sustainability that is measured in the IQP within the framework of the social cohesion indicator. Furthermore, once economic development fits governance, pollution and environment degradation will start to decrease as initiated in the Kuznets curve.

Thus, through the IQP, the principle of Responsibility towards nature or Environmental well-being (EWB); the principle of Solidarity between individuals of the same generation and those of future generations or Social well-being (SWB) and the principle of Economy of limited resources

[33] We preferred not to include them due to data unavailability for Lebanon for the Land management indicator and a lack of confirmation to air pollution indicators for the same country.

or Economic well-being (EWB), define ethics for sustainability. These three principles have helped us to rethink development in the ecological model to highlight the limitations of the indicators that were primarily taken to measure sustainability (the HDI), and provide an indicator of qualitative progress (IQP) that can consign the economy in relation with the social relief and the environmental one .

Far from the criticism of the quantitative indicators for sustainable development apprehended in the HDI, the IQP that we constructed as a quality progress indicator - by relying on the recent recommendations of the UNDP and the acknowledgments for a need for a new indicator incorporating EWB, EWB and SWB - confirms one important conclusion for policy reading in developing countries: governments have to channel economic growth into achieving environment protection and social development. This could be uttered by the rules of social cohesion and the respect for the environment. Consequently, if the IQP exists as other indicators follow; one important thing is now implicit: Economy, Responsibility and Solidarity should be the vectors in any endogenous model referring to sustainable development, specifically in developing countries.

At last, applicability of the Kuznets curve model to Egypt and Lebanon was dependant on the data relevance and reliability: whether to include water pollution or other indicators such as air pollution, the curve would reveal a different shape. In fact, as we demonstrated, for Lebanon, there is no indication for a meaningful environmental Kuznets curve for local water pollutants. The reverse case is seen for Egypt where tremendous efforts were done during the last decade to assure water quality and a better management of water resources. We observe that when the growth rate per capita rises, even in small figures, water pollution decreases.

However, if the matter of environmental relief is solved, the major issue of better wage distribution and a reduction of social inequalities should be addressed for future research programs.

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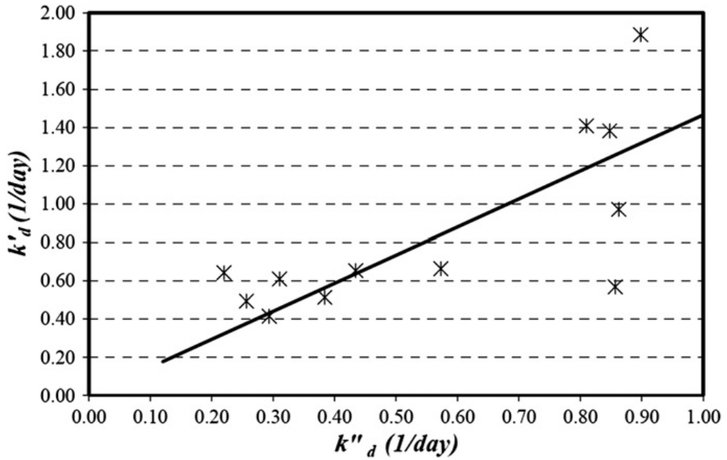
APPENDIX

Figure 7. BOD decomposition rate as the Water pollution indicator for Lebanon (Data-based BOD decomposition rate vs. formula-based one).



Source: Assaf, H., Saadeh, M., (2008). Environmental Modeling and Software (23), 1327-1337: 1332.

Figure 8. COD averages as the water pollution indicator for Egypt

Table 2.1: Comparison between COD Averages in Some Governorates in the Arab Republic of Egypt

Years / Gov.	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	Permissible Limit mg/l									
Aswan	9.14	9.30	8.87	9.10	10.23	9.32	9.34	9.00	9.00	9.60
Sohage	6.46	4.88	4.02	4.39	13.53	13.74	11.72	11.50	11.50	9.60
Aswit	74.97	25.19	12.34	8.56	7.15	7.41	7.60	8.00	8.00	6.60
Bmina	10.39	3.99	4.65	4.10	5.76	6.49	8.00	8.00	8.00	7.10
Banyswat	19.21	13.49	8.94	9.77	9.20	7.39	8.40	7.70	7.70	9.60
Cairo Region	14.76	14.60	13.48	13.4	8.97	11.84	9.76	10.00	10.00	14.00
El garba	32.62	27.75	24.66	34.8	19.88	25.83	21.99	13.00	11.00	11.00
El dakhlya	13.64	12.82	10.39	8.8	8.42	7.83	8.40	7.70	8.60	9.20
Damitta	28.58	29.07	26.10	28.1	32.04	24.11	22.80	20.00	19.00	18.80
Alexandria	35.23	30.58	24.25	21.9	16.19	14.94	16.80	13.80	19.50	19.50
Port Said	16.08	12.75	14.42	15.0	10.53	19.41	13.97	14.00	8.30	9.90

Source : MoHP

www.business-systems-review.org

Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

Using System Thinking to Study Sustainability of Colombian Dairy System

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Submitted: April 30, 2014- Published: August 19, 2014
DOI: 10.7350/BSR.D12.2014 – URL: http://dx.medra.org/10.7350/BSR.D12.2014

ABSTRACT

Colombia raises 1.73% of global livestock inventory. Key challenges of the sector are to increase the animal production in order to nutritionally sustain the growing population, to ensure a rational use of natural resources for agricultural purposes, either combining criteria of economic sustainability and social equity. Agriculture can be considered as networking factor for productive, environmental and social components. In Colombia development of rural areas comprised complex dynamics affected by low technological farming systems and conflicts over land use and ownership. Free trade and climate change also act on the system as exogenous variables. The use of modeling tools and methodologies, such as system thinking and system dynamics, could help to manage rural development policies taking into account different components and to analyze their interconnections within the system. This comprehensive approach can also be useful to stimulate a multidisciplinary focus on future trends of development. The aim of this work was to qualitatively explain the main loops limiting and enhancing the development of the rural areas oriented to milk production in Colombia, using causal maps and conceptual diagrams. Three main components and their relationships were analyzed: Production and Economics, Environment and Social. Strategies of future development of rural areas suitable for milk production were suggested. Dairy farm management and rational land use supported by technical assistance were proposed alternatively to extensive-extractive livestock system to reach economic, social and environmental benefits.

***Keywords**:* armed conflict, dairy cattle, farm profit, grazing management, land use.

1. INTRODUCTION

1.1 Premises

Fundamental challenges of the agricultural sector in order to pursue sustainability are to produce higher amounts of food to sustain the growing world population, to rationally use natural resources, to follow economic criteria, fairness and respect for the environment. Feeding the world in 2050 is a major challenge at the forefront of the global development agenda. The importance of agriculture in addressing these challenges has reemerged in recent years as food security issues are considered in a more holistic manner, and livestock is recognized as part of the solution (Smith et al., 2013). According to Cooprider et al. (2011), sustainable agriculture might allow a balance between production, environmental and social components.

Livestock provide a valuable source of food and plays a key roles in societies worldwide (FAO, 2009). The livestock sector constituting the world's largest user of land resources (80% of all agricultural land is under grazing or feed crops) and 8% of global water use (Steinfeld et al., 2006). In addition for the near future, livestock is considered a source of food, livelihood, employment and economic growth. Livestock is estimated to represent 40% of the global value of agricultural production, generating employment for 1300 Million people and livelihoods for billions of small producers in the world (FAO, 2009).

The livestock systems based on grazing occupies 40% of the earth's surface and support some 120 million people (FAO, 2012a). Livestock are not consuming food that could be directly consumed by people, rather they are converting materials that humans cannot eat into milk and meat. Herrero et al. (2009) estimate that 7% of the milk and 37% of the global beef and lamb production is from grazing systems. FAO (2011) estimates that such grassland-based systems provide 12% of the milk and 9% of the meat annually.

Animal food consumption rate has been forecasted to increase in the next decades, especially in developing countries (Steinfield et al., 2006). However, the efficiency of livestock systems in developing countries largely depends on the interaction between ecological, economic, social and technical factors (Rios, 2010). Especially in developing countries, production systems should undertake methodological and organizational changes to survive, and grow in an increasingly demand of dynamic equilibrium between sustainability and competitiveness (Rios, 2010).

1.2 Livestock production in Colombia

Livestock world population, according to FAO statistical sources, has grown at an average annual rate of 1.48%, reaching a cattle inventory of 1,558 million head in 2008. Colombia holds a 1.73% of this amount, ranking 3rd in South America after Argentina and Brazil, and 13th globally (Gómez & Rueda, 2011). Colombia hold a herd of 22,666,751 animals, of which 12,696,986 are females, 5,929,418 are males and the remaining, calves under one year, located in 500,000 farms (Fedegan, 2013). Livestock is reared in 39.2 ha, only 53,8% of them are areas that can only be destined to livestock activities (PNUD, 2011). From this inventory, 60% is devoted to meat production, 38% is dual purpose and the rest (2%) to specialized dairy (Fedegan, 2013). Only 22.7% of the 21.5 millions ha with broad agricultural potential, are used for crop cultivation (PNUD, 2001). National milk production level are of about 4.5 liters/d per cow, rather low if

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

compared to average production of the highest producers (about 30 liters/d per cow) and to world average (about 9 liters/d per cow; FAO, 2009). The price paid to the farmer per liter of sold milk, is on average 0.47 US $, with fluctuations due to the seasonal production pattern and import flows to which the country is exposed (milk powder, liquid, cheese; Fedegan, 2013).

According to PNUD (2011), the Colombian livestock sector is characterized by low production level and low technological advances, both of them needing improvement to increase productivity. In spite of that, the contribution of livestock to the agricultural sector is very significant both in terms of gross domestic product (GDP) and employment generation especially for livelihoods of small and medium producers. The livestock sector holds little less than 1,6% of national GDP, 20% of agricultural GDP and 53% of livestock GDP (Fedegan, 2012). As comparison, crops such as coffee, sugar cane and oil palm, make a percentage contribution of 5.9%, 4.2% y 2.2% respectively. The occupation in the rural areas derived from livestock sector summed up to approximately 950,000. For that reason livestock can be considered as one the most important sectors of direct employment in the country, with a share of 7.0% of the total national employment, and of 25% of rural employment (Fedegan, 2012).

Colombia, on average, spends 7.1% of total income to consumption of meat and dairy products, corresponding to 20.8 kg/year of meat and 141 liters/year of milk per person (Fedegan, 2012). In 2012, the average consumption of meat and milk in world, developed and developing countries, were 42.5, 78.4 and 32.8 kg/year of meat and 106.1, 237.8 and 71.5 kg/year of milk per person, respectively (FAO 2012b).

The stocking rate, about 0.6 head/ha, has not changed significantly in the last twenty years, which reveals the poor technological transformation of the livestock sector and indicates steady state of traditional management conditions. The low stocking rate per hectare, classifies the national livestock farming as extensive-extractive system. This form of livestock farming system also negatively affects incomes, conservation and proper management of the environment and natural resources. incomes, limiting the possibilities of human and rural development. It also critically affects the sustainability (environmental, economic and social) of many agricultural production areas, characterized by accelerated degradation rate of natural resources, reduction of employment generation rate and increasing rate of rural poverty (PNUD, 2011). In addition, Colombia has been the scene of many social crises, the current armed conflict has been around for over fifty years. The weak institutional presence, the difficult geography of the country, lack of infrastructures and low population density in rural areas create conditions conducive to the presence of armed groups and the development of the conflict (Arias & Ibáñez, 2012). The rural population and agricultural producers have encountered massive economic and social costs of the civil war. In facts, the conflict has been affecting household's agricultural production directly and indirectly. Direct effects arose from violent actions by armed groups against civilians, while indirect costs arose because of uncertainty caused by the presence and enforcement of rules by armed groups (Arias & Ibáñez, 2012; Balvè, 2013).

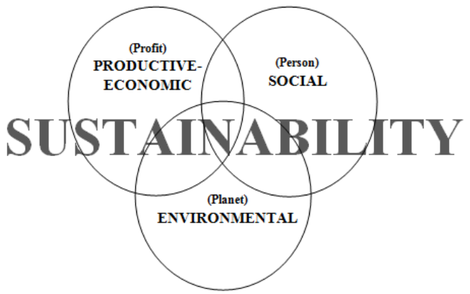
Especially in the flat areas, farmers tend to invest more in crop cultivations than on livestock production, either for profitability or organization purposes. Those crops are often managed as monoculture, mainly sugar cane and palm oil, destined to production of ethanol and biodiesel and not to human food (PNUD, 2011). Furthermore, armed illegal groups often use industrial energy crops as target of fertile land grab, affecting locals equilibrium (Balvè, 2013). For that reason, livestock is more and more pushed towards the hillside area. In addition, the presence of insurgent groups and armed conflict alters production decisions on land use, limiting the investments on agriculture due to the threat to safety of the workers (Balvè, 2013); this is

especially truth for livestock activities where herd management requires daily human presence. At the same time the complexity of agricultural systems is also dealing with the interaction among of biotic and abiotic components. In fact, human emphasis on land and livestock also changes depending on the variation of inputs and product prices and on the new scenarios of climate change.

2. SUSTAINABILITY AND LIVESTOCK PRODUCTION

Agricultural activities require organized effort involving natural resources, human, monetary and technical capitals to: i) produce and sell goods and services; ii) produce profit; iii) satisfice the consumption patterns of society; iv) guarantee sustainability.
In 1987, the United Nations World Commission on Environment and Development published the Brundtland Report, more frequently known as 'Our Common Future'. It said: "*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987).
Production systems and type of management have a great impact on sustainability (Garay et al. 2013). It is due to the fact that sustainability of rural systems deals with environmental and economical components of the same system, and they in turn affect the social component (Pretty et al. 2010). Many different definitions of sustainability were proposed in literature, since the concept of sustainability or sustainable development has been originated (Peterson, 2013). Figure 1 summarize the sustainability concept according to Peterson (2013), which state that all the definitions of sustainability should include: i) The triple bottom line, which means that something is sustainable if it can simultaneously achieve economic feasibility, social responsibility or justice, and environmental quality; ii) The three Ps (Profit, People and Planet) pursuing simultaneous criteria for achieving better economic, social and environmental outcomes.
In this work, we adopted the concepts of sustainability suggested by Peterson (2013). Furthermore, Ríos, (2010), defined sustainability the ability of an agro ecosystem to maintain the quality and quantity of natural resources in the medium and long term, reconciling agricultural productivity with reduced environmental impacts and in response to social and economic needs of rural communities.

Figure 1. Sustainability definition obtained by integrating concepts from Cooprider et al. (2011) and Peterson (2013)



Source: Authors' elaboration

3. AIM OF THE PAPER

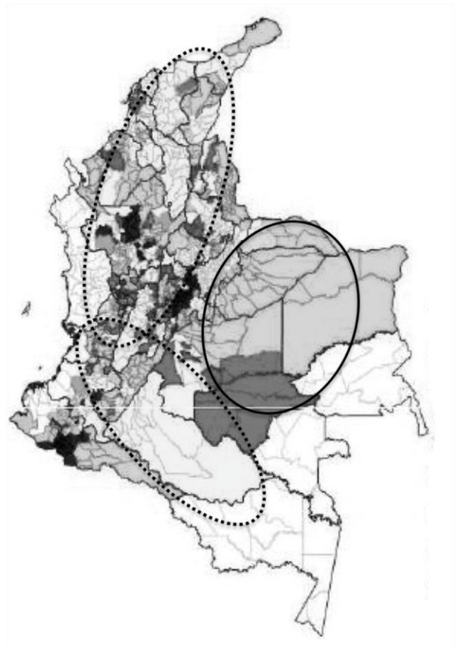
With the challenge of improving, consolidate and strengthen the dairy sector in Colombia, every effort must be supported by an holistic understanding approach which takes into account the heterogeneous components of the system. Systems thinking (ST) and system dynamics (SD) methodologies might be used with this purposes to improve the system understanding. Definitions of ST and SD were reported by Tedeschi et al., (2011): "ST is the recognition that organizations (and the world, for that matter) may be seen as a complex, integrated system in which a change made at a given time will ripple through the system and will impact other variables instantaneously or over time because they are connected in some way. Whereas SD is a methodology that applies ST in developing formal models that are used to describe (and simulate) the relationships among variables, including time, by clearly identifying the behavior of the variables". ST and SD used to study the dairy rural areas of Colombia might help the actions of decision makers, technicians and producers, in order to define policies for future growth, as already demonstrated by its applications in other geographical areas or economical sectors (Parsons et al., 2011; Stephens et al., 2012; McRoberts et al., 2013; Atzori et al., 2011).
In this context, the aim of this work was to apply a systems thinking approach to study the main factors associated with sustainability of extensively managed areas destined to dairy cattle production in Colombia. This work will try to show and explain: i) the process of dynamic hypothesis formulation based on mental models and literature review, ii) the feedback loop analysis and, iii) the individuation of possible leverage points to be focused in future policies on the basis of developed mental models and feedback loop analysis. Specific objective was to get policy insight, studying the role of the farm and land variables on the structure of the dairy system and their relationship with the economic, environmental and social components in the Colombian country.

4. MODELING METHOD

4.1 Study area

The work was conducted retrieving information related to dairy cattle extensively managed in Colombia. This country is situated in the northwestern corner of South America, almost entirely in the arid zone between the Tropic of Cancer and the Tropic of Capricorn. (4°00'N, 72°00'W). Despite the latitude, the climate greatly varies with the altitude, due to the mountain Andean system, which crosses the country from South to North. The low regions and valleys are arid, with average annual temperatures ranging from 24°C to 27°C. Between 500 m and 2,285 m in altitude, the climate is subtropical, whereas temperate climate can be found between 2,285 m and 3,048 m. The cold climate zone is located above 3,048 m, where the temperatures range from 0°C to 13°C. All year long, and for periods of three months, the rainy season alternates with the dry season (FAO, 2003).
Cattle are raised in in five major biogeographic regions (Andean, Amazon, Caribbean, Orinoco and Pacific). According to Murgueitio & Ibrahim (2008) dairy cattle herds are mainly located on high Andean forests and moors, extending production systems in areas of plateaus and low moorland (2,000 – 3,200 m); whereas, double purpose cattle, breed for meat and milk productions, can be mainly found in tropical areas. In general the extensive productions overwhelmed other livestock systems (Fedegan, 2012; Figure 2).

Figure 2. Geographic distribution of livestock systems in Colombia for the year 2010. Areas within dotted circles indicates zones of extensive milk production; small areas colored in black indicates specialized milk production zones; areas within the solid circle indicates zones of extensive cattle livestock with other purposes than milk (meat, live animals).



Source: adapted from Fedegan (2012).

The presented model is built using causal maps mainly based on published evidences and mental models. Drawing of causal loop diagrams, or causal maps, is a technique for mapping the feedback within and across interacting subsystems; it is often used to help communicate the structure of the proposed conceptual model and the supposed behavior of the systems (Sterman, 2000). The convention for drawing a causal loop diagram consists of a set of variables connected by arrows denoting causal influence with a given polarity, to indicate how the dependent variables change in respect to changes of the independent variables (Sterman, 2000).
The map of the presented model was built considering 3 main components, analyzed and modeled as subsystems; every subsystem consisted of a semantic aggregation of variables:

i. *Production and economics*. It include: a) animal variables, referring to the size of a generic herd which consist of calves, heifers, milking cows, dry cows, bulls (reproductive dynamics of the herd were considered here); b) animal performances, which covers milk production level and the amount of milk sold; c) economic components. The economic component, was considered part of the animal subsystem, since it influences all the other components. It was

established on the lines of Peterson (2013) considering the animal subsystem as the main source of profit generation within the focused boundary. The economic part cover the incomes from milk sales, milk price, fixed and variable production costs, profit and external effects given by the free trade. Variable costs were intended as related to animal feed required for milk production, whereas fixed costs included feed for animal maintenance and other farm costs.

ii. *Environment and biomass production.* It comprised variables related to soil fertility, biomass production, pasture management, water resources.

iii. *Social subsystem.* Consist of variables related with land use destination, farm employment and with armed conflict.

Variables were connected among them with causal link and then were classified on the basis of their polarity signs. The loops generated by the variable connection were firstly labeled with name and different annotation and then were studied on the basis of their characteristic of reinforcing (R) and balancing (B) loops which was in turn determined from the multiplication of the variable connection signs within a given loop. Loops were then ordered with numbers (Fernald et al., 2012).
The study of the system was only based on feedback loop analysis and modification. Polices were proposed to improve sustainability and to directly impact on the development of the rural area, both considering changes in endogenous variables and adding exogenous variables, such as, governmental subsidies. The effects of the policies on the new structure of the system were then discussed as a basis of decision support for stakeholders of the target area. In particular it was assumed that enhancement of economic and environmental efficiency of dairy sector could stimulate improvements also in the social components of the rural area.
Due to the exclusive use of causal diagrams and feedback loop analysis, this work can be considered as a first step of the full SD methodological approach to study complex systems (Sterman, 2000). In fact, stock and flow diagrams and quantitative simulations will not be used in this paper to get conclusions from system analysis or to simulate management policies.

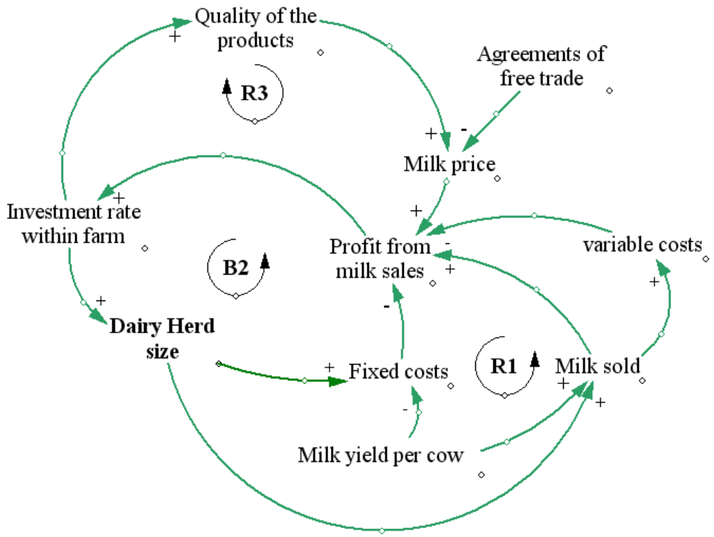
4.2 Description of the developed causal map

4.2.a Production and economics.

In Figure 3 is shown the production-economic subsystem. The general goal of dairy operations is to increase farm returns (Fetrow et al., 2001). In dairy farms incomes are mainly generated by the amount of milk sold, which increases as herd size increases, and its also positively related to cow's production level and to milk price (R1; Milk production). Costs are proportional to herd size (B2), and profits can be simply defined as revenues minus costs. Part of the profit from milk sales can be reinvested in the farm in order to enhance farm productivity and profitability. The selling price of the product is negatively affected by free trade agreements (exogenous variable) and positively affected by the quality of the products (composition and safety), which can be improved with farm investments (R3).
Considering a constant production level of the animals in extensive-extractive conditions, the herd size might be intuitively increased in order to increase incomes form milk sales. However, increasing the number of animals without increase their production level, the possibility to get more profit is limited by the fact that each cows requires a constant amount of feed for

maintenance and a variable amount of feed proportional to its production level (Capper, 2013; Atzori et al., 2011). Thus this action increases the farm fixed costs for maintenance feeding cost of the same herd. Conversely, each increases of milk production level of the cows will reduce the cost per liter of milk sold. On the basis of this evidences herd size and its production level are the main variables that limit the growth of production subsystem.

Figure 3. Production-economic component of the Colombian livestock system



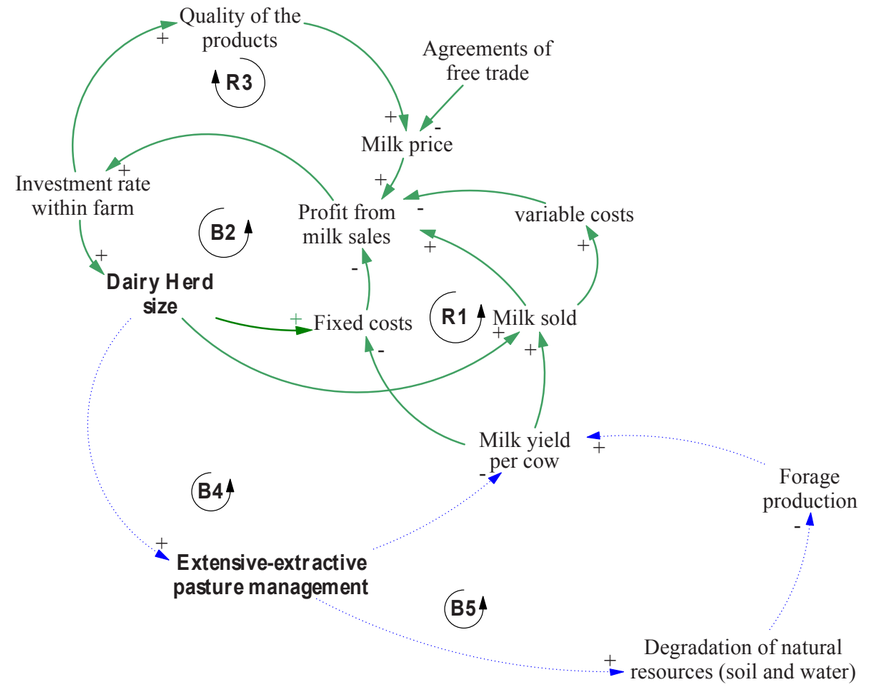
Source: Authors' elaboration.

4.2.b. Environment and biomass production.

In Figure 4 are described the relationships among the production and environmental subsystems. The environmental component is the main factor responsible for cattle nourishment in extensive system, considering that pasture is the main/only source of cattle feeding. Thus, an increase in herd size, in order to increase milk sold, should result in a continuous increase of extensive grazing under a traditional extractive management practices (B4; Rua, 2009). It would require additional available areas and, perhaps, it might cause overgrazing and degradation of natural resources, such as soil fertility and water utilization (B5; Rua, 2009). According to FAO (2012a), livestock production is globally the largest user of agricultural land. On the negative side, there are several environmental implications associated with the expansion of livestock sector on land utilization. In fact, the growth of this sector has been the major force in deforestation in Latin America and the Caribbean, in addiction overgrazing phenomena were recorded in other regions (FAO, 2012). Connections reported in Figure 4 highlights the negative feedback loops that regulate the traditional management practices. Inadequate use of the land might lead to a possible reduction of biomass production, a consequent reduction of animal performances (B5) and

decrease of the milk sales and farm incomes (R1). A heavy reduction of farm profit below certain levels could generate a domination of R1 and the further involution of the milk production system.

Figure 4. Production (solid line) and environmental (dotted line) components of the studied system.



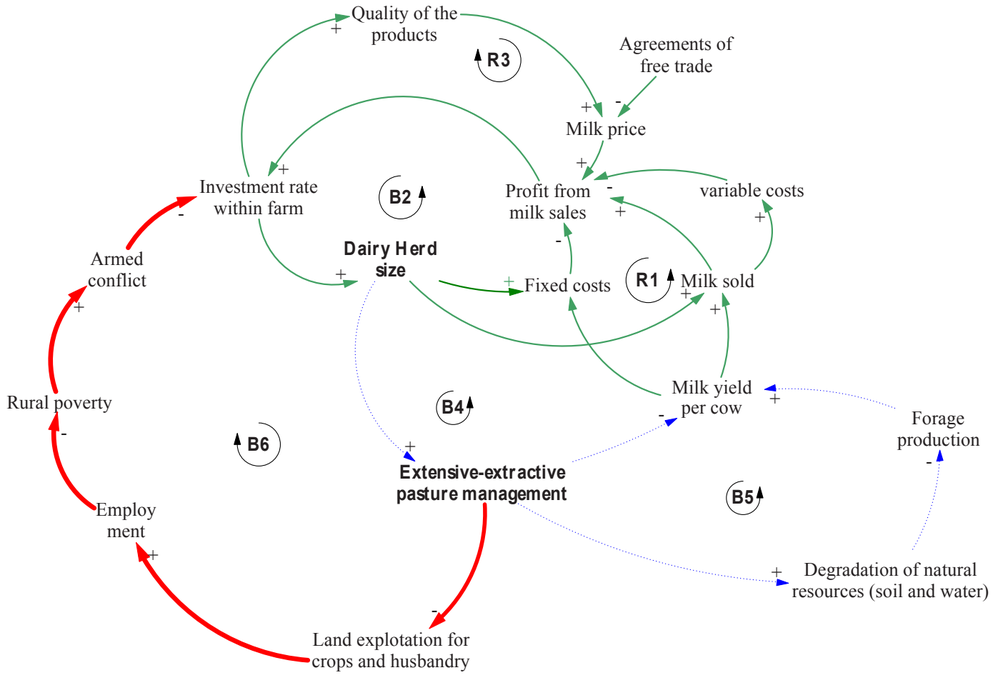
Source: Authors' elaboration.

4.2.c. Social subsystem

The integration of the social component on the system boundary is described in Figure 5. The traditional land management, based on extensive grazing, affects the social equilibrium of rural areas (PNUD, 2011). In fact, in areas where livestock activities are maintained with an extensive-extractive management, the increase of extensive grazing reduces directly the land exploitation. According to PNUD (2011), the underutilization of soil by seed crop and its overuse in livestock, point out the inappropriate land use, introducing factors of economic and social inefficiency. It also originates conflicts for land use, when extensively managed livestock is concentrated in soils suitable for agriculture and closing possibilities and options for small and medium property (PNUD, 2011). Extensive management reduces job generation (Fedegan, 2006), which in turn

increases poverty of rural populations (Figure 5). It helps to stimulate the migration of peasants to join the ranks of the insurgent groups, and it also attracts insurgent groups to more control, economically and geographically, scarcely populated areas (Arias & Ibáñez, 2012). These groups also enhance the armed conflict in the country. The armed conflicts act on production decisions affecting the farmers' perception of personal safety, which has as a direct consequence the limitation of investments (Arlas e Ibáñez, 2012). Moreover, armed groups are claimed to be related with action programs aimed to land grab for industrial crops destined to biofuel cultivation or to illegal money investments in actions of "land laundering" as defined by Balvè (2013). Hence, farmers' investment in livestock production systems are directly hampered (Arias & Ibáñez, 2012). Lowering investments on livestock production also determines a reduction of herds' size and a consequent reduction of employment. This behaviors is represented by the balancing feedback loops (B6) reported in Figure 5.

Figure 5. Integration of social (bold lines), production (solid lines) and environmental (dotted lines) components in the system boundary.



Source: Authors' elaboration

4.3 Strategy proposal

In order improve the sustainability of dairy production in the studied socioeconomic contest, a policy strategy oriented to technical efficiency and resource rationalization was deducted from loop analysis; it should be mediated by technical assistance and education of the rural population. The proposed policies is aimed at introducing a pool of technology and management actions on animals, soil and crop in order to enhance profitability and environmental preservation. A government role was also assumed.

4.3.a. Production economic actions and its effects.

The proposed strategy involve investments and low cost actions aimed at switching from the traditional management to an efficient one (Figure 6). This action is oriented to cut the effects of B2 loop, which determines an increase of fixed cost for herd maintenance proportional to the increase in herd size. In facts, global trends of livestock system improvements are characterized by increases in efficiency that determines reduction of heads without lowering milk yield, determining ecological footprint benefits as well (Capper et al., 2009). Whit this action the power of the loop B2 was reduced and the investments were switched on management efficiency, that was included as new variable generating the reinforcing loop R2a (Figure 6). The destination of each production effort to milk production level of the cow would allow both to reduce the ratio maintenance costs/production costs (fixed costs/variable costs) and to increase the farm profit. Thus, the reinforcing loop R1 might be sustained in a more profitable way (Figure 6).

4.3.b. Environment related actions and effects.

The action on this subsystem was aimed at substituting extensive-extractive grazing with rational land use, or managed grazing. From a technical point of view this action is related to the feeding management of cattle groups, to the pasture and biomass management produced by available land (Molle et al., 2008). Several techniques are available to simultaneously maximize the nutrients produced by units of land and animal intake, satisfying the herd requirements during the year. This techniques, also studied in tropical areas are based rational grazing and rational pasture use (Abdalla et al., 1999; Heard et al., 2013; Nahad-Toral et al., 2013)

Switching from extensive-extractive pasture management to rational pasture management, milk production increases and production costs per unit of land and per unit of product are reduced (Abdalla et al., 1999). Consequently, it could allow farmers to increase profit and farm investments, generating further increase of the efficiency by enhancing R1 (Figure 3 and Figure 6).

Looking at the causal maps, the addition of this variable in the system will cause: i) the reduction of the power of the balancing loops B4 and B5; ii) the creation of two new reinforcing loop R4a and R5a, which has direct and positive impact on milk sales (Figure 6).

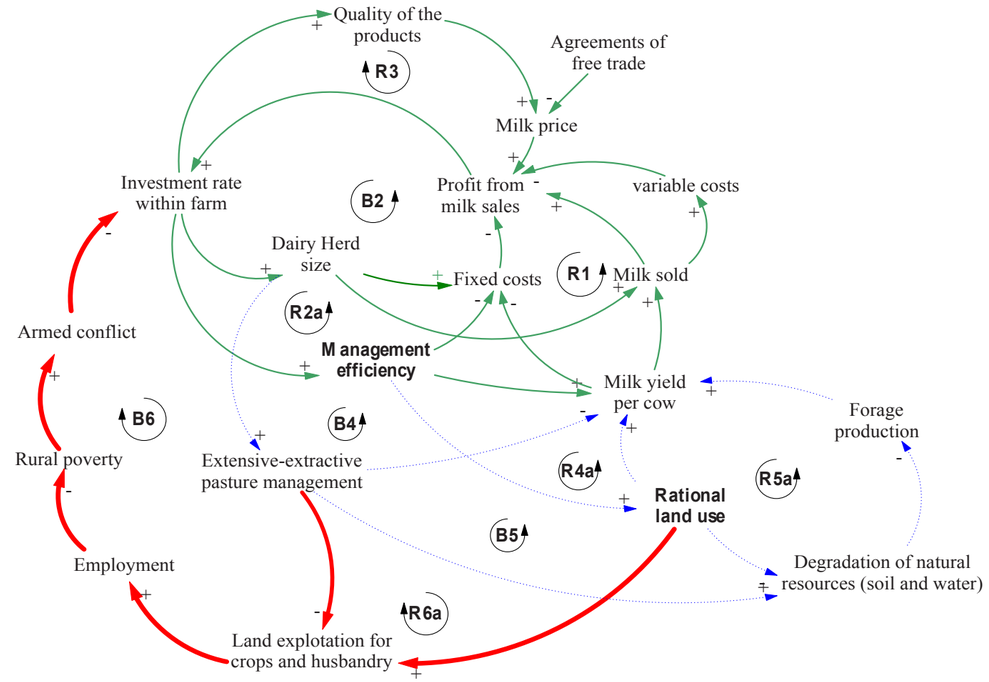
Blank (2013), says that the economic viability is a key factor in identifying system sustainability. It should be envisioned not only in monetary expanses, but principally in terms of returns on investment. In addition, rational land use, and other options of proposed actions, have a direct positive effect on the degradation of natural resources (land and water) which are the principal factors influencing biomass productivity from land (FAO, 2006). From this point of view the balancing loop B5 might be also inhibited by the reinforcing loop R5a, which also positively and

indirectly affect milk production and helping to maintain the ecological equilibrium and sustainability of the area (Figure 6).
This is in agreement with the sustainability intensification concept proposed by Pretty et al. (2011), which affirmed: "producing more output from the same area of land while reducing the negative environmental impacts and at the same time increasing contributions to natural capital and the flow of environmental services". Capper (2013) demonstrated that improvements in management, nutrition, genetics and the application of new technologies, US dairy industry in 2007 compared with 1944 required only 21% of the dairy population to produce a set quantity of milk. Consequently, feedstuff use was reduced by 77%, land use by 90% and water use by 65% per unit of milk. Manure output per unit of milk produced in 2007 was 24% of that in 1944 and the total carbon footprint per unit of milk was reduced by 63%. Despite the increase in total milk production between 1944 and 2007, the total carbon footprint for the entire dairy industry was reduced by 41%. In study is noticeable that large advantages were obtained in the first decades, when intensification of production level allowed to reduce the stocking rate and to stabilize the production of animal products. This fact suggest that high benefits can be reached in the short term period.

4.3.c. Social implications

Previous actions have social implications directly related to employment generation. The implementation of rational land use and efficient herd management could guarantee increases of profitability, and it will needs to be associated to human supervised farm practices. Furthermore, the rational land use might reduce the conflicts for land destination by motivating the land management for specific purposes, like crops or livestock activities. It would reduce the areas with improper destination in respect to the potential use (arable land used for extensive extractive activity with low yield for land unit), and it would enhance the release of areas for food production (PNUD, 2011). There are several farm examples where better livestock and pasture management allowed farmers to get efficient cattle production and also to destine part of the owned land to efficient crop cultivation. According to Niles (2013), efficient agriculture and ranching provide significant social benefits to society through the provision of food and fiber, ecosystem services and community development, employment generation; in addition farm profit increases are, as well known, associated with alleviation of rural poverty and better nutrition (FAO, 2006). Rural poverty, in its part, is one of the principal factors that leads to thickening the insurgent groups (Daly, 2012), increasing farmers risks and uncertainty. Thus, the balancing loop (B6, Figure 6) that limited the growth of social system might become a reinforcing loop helping to promote social equity (R6a, Figure 6).
FAO (2012b), emphasized the importance of agricultural investment for growth, reduction of poverty and hunger, and the promotion of environmental sustainability. Furthermore, the literature in the field of tropical livestock production already pointed the need to pursue objectives like: to increase the intensity of livestock production, to meet the increasing food demand, to reduce the environmental impact of livestock production per unit animal product, and to contribute to poverty alleviation (World Bank, 2009; McDermott et al., 2010; Herrero et al., 2013).

Figure 6. Strategy proposals for the Colombian dairy system. Production (solid lines) environmental (dotted lines) and social (bold lines) components.



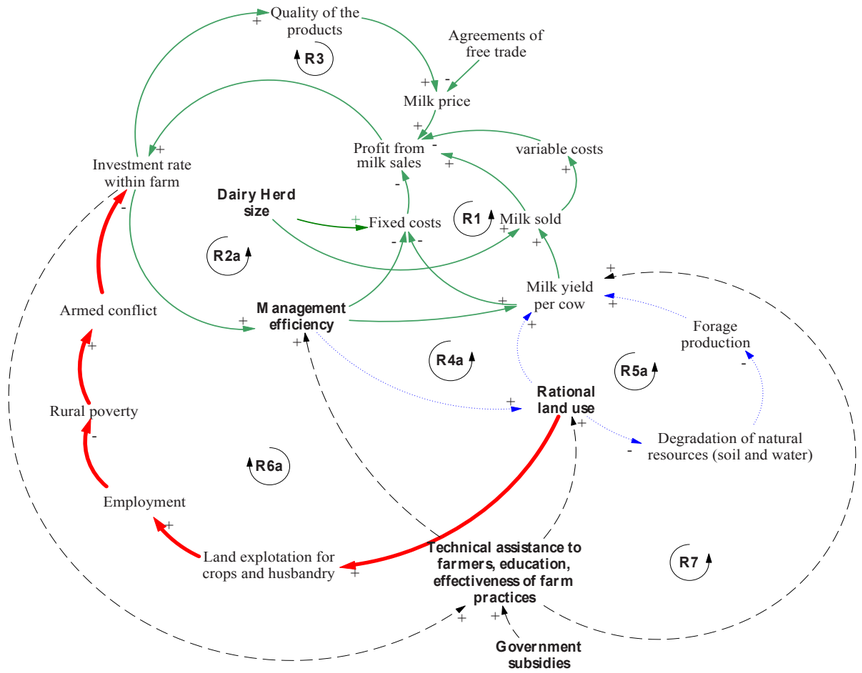
Source: Authors' elaboration.

4.3.d. Technical support and institution's role.

In Figure 7 was reported the final causal diagram where government subsidies were also included and undesired loops (B2, B4, B5 and B6) were cut to stimulate favorable loops (R2a, R4a, R5a, and R6a). An important role of public government was supposed as exogenous variable in the studied system boundaries (Figure 7). As already mentioned, the improvement of the system was supposed enabled by increasing the technical assistance and farm education level. It might help to reach faster the improvement of farm practices and to obtain earlier results in terms of system response.
A technical support should be firstly induced by governmental subsidies oriented to the development or the maintenance of rural areas. The farmer perception of economic benefits would stimulate the farmer demand of more technical assistance and education (Atzori et al., 2013). Furthermore, the same farm profits could be in part destined to technical advices or support. In this case a new reinforcing loop (R7; Figure 7) will be generated. It will increase milk

sales, and in turn revenues to be invested in the same strategy. When this reinforcing loop will reach a good grade of dominance, the system will be less dependent from external resources (government subsidies for developing areas).
Not significant relationships among biographical characteristics and profile of farmer and farm efficiency were found in a recent study conducted in Costa Rica dairy cattle farms. Conversely, better farm performances and increased managerial capability of dairy farmers were found in farms assisted by extension services with grater openness to technical support and advices (Solano et al., 2006). The same authors reported several studies and many motivated examples of the beneficial effect of technical support in farmer managerial capacity, farm efficiency and profit generation.
Government support is not to be considered as a "*Deus ex machina*" actor within the system, the World Bank Development Report (Conflict, Security, and Development; WDR, 2011) concluded that by strengthening and building confidence in legitimate institutions is the only way to break chronic cycles of violence in fragile or conflict-affected countries.

Figure 7. Complete causal diagram of Colombian dairy sector. Production (solid lines), environmental (dotted lines) and social (bold lines) component integrated with policies of exogenous government subsidies (dashed lines).



Source: Authors' elaboration

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

5. CONCLUSIONS

A causal map of the main variables influencing a generic extensively managed area for dairy cattle production in Colombia was developed using a system thinking approach. Several limits might be emphasized regarding the reliability of the proposed diagram within the Colombian complexity. Further steps of the modeling process (such as translation in stock and flow diagram, quantitative simulations and validation of deduced results) are needed in order to assess the formulated hypotheses. The present approach, based on system thinking techniques and qualitative analyses of mental models and feedback loops within considered boundaries, allowed us to describe the observed conditions and to summarize literature evidences in a structural description of the system. Negative loops and structure evidenced in the traditional system can drive the system behavior to low sustainability, also inhibiting or damaging the economic, environmental and social components of the system. The developed causal model emphasized that herd management efficiency and rational land use might enhance soil conservation and stimulate farm profitability. The model also highlighted the benefits of herd management and of land use on employment generation. It, in turn, was related with improvement of social welfare in rural areas.
The model revealed the complexity of connections among simple elements of the system and renewed the awareness that conservation must derivate from conscious management of natural resources. The proposed strategy showed that the sustainability of the Colombian dairy sector is sensitive to the type of production management. Shares of efficient management and rational grazing might turn negative loops, which are inhibiting system sustainability, in reinforcing loops that might promote dynamic balance between sustainability and development, welfare and economic growth.
System analysis results, suggested policies and literature findings reported in this paper, pointed to support the improvement of the decision making process in rural areas in Colombia destined to cattle production. Objectives of efficient management for food production and for social welfare in rural areas should be pursued as direct actors of conservation and sustainability.

ACKNOWLEDGEMENTS

This study was supported by the investigation group Ganado criollo Hartón del Valle - Universidad Nacional de Colombia (Palmira) and the national research training program "Becas Colciencias: convocatoria 567. The authors would like to thank Dr Giustino Gaspa for its help in manuscript editing.

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Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

A Model for Organizational Sustainability Management: a Structural Equation Modeling approach

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Submitted: April 9, 2014- Published: August 20, 2014
DOI: 10.7350/BSR.D11.2014 – URL: http://dx.medra.org/10.7350/BSR.D11.2014

ABSTRACT

Despite the substantial body of literature concerning different management models aligned with principles of organizational sustainability, its understanding, incorporation and operation in the business field have not yet grown significantly. This paper aims to analyze and discuss the FRASOR framework for Organizational Sustainability proposed by Munck, Munck and Borim-de-Souza using a structural equation modeling approach. Analyses of the measurement model confirmed its convergent validity, composite reliability and discriminant validity. The analysis of the structural model showed discrepancies in some constructs, which, to some extent, disconfirm theoretical assumptions regarding the systemic and balanced relationships among the concepts in FRASOR. On the other hand, when compared to other research our results confirm the possibility of applying FRASOR empirically. Still, organizational sustainability is an issue that is undergoing a definition in the management field, and whose theoretical framework requires continuous improvement, application and validation to be effectively institutionalized in academia and business.

Keywords: organizational sustainability, qualitative validity, quantitative validity, structural equation modeling.

1. INTRODUCTION

Societal and organizational social-environmental concerns represent reactions to the visible impacts that human activity has been causing to the environment. In addition to their potential to cause negative and positive impacts, clearly corporations are more likely than public organizations to influence and even determine the economic, social, cultural, environmental, and political development of the communities with which they are involved. As a result, their contribution to the debate on the roles played by several institutions and organizations in sustainability is extremely valuable.

Operationalizing management models focusing the issue of sustainability is crucial in organizational studies, precisely for its applied nature. Despite the presence of substantially distinct models in the literature, a significant understanding of this phenomenon, of its impact, incorporation, and operation in the business environment does not seem to have been reached yet (Stubbs & Cocklin, 2008). A higher number of initiatives toward communicating so-called sustainable corporate actions can be seen, as well as a distance between rhetoric and reality when it comes to implementing sustainability management practices (Hanh & Scheemesser, 2005; Vos, 2007; Hacking & Guthrie, 2008; Barkemeyer; Holt; Preuss & Tsang, 2011).

Munck, Munck and Borim-de-Souza (2011b) have already pointed out that many studies on issues related to organizational sustainability (OS) are often vague, conflicting, and lacking a common and unifying conceptual basis. Despite the significant increase in the quantity of studies addressing this subject, their quality often falls behind, largely due to a fault approach or to the absence of empirical studies (Kallio & Nordberg, 2006).

Munck et al. (2011b) contribute to the discussion by developing a representative framework for organizational sustainability called FRASOR (its acronym in Portuguese). The authors consider OS an organizational competence, derived from the following competences: Economic Sustainability, Environmental Sustainability and Social Sustainability. These competences, in turn, are made possible by the interaction and compliance of other competences, namely, Eco-Efficiency, Social-Environmental Justice and Social-Economic Inclusion. Therefore, these six competences consist of corporate behaviors that structure organizational sustainability.

A careful analysis of the referred framework shows an advancement in approaching sustainability in terms of its components, as compared to other similar models (Azapagic, 2003; Wheeler; Mckague; Thomson; Davies; Medalye & Prada, 2005; Cheng; Fet & Holmen, 2010; Molteni & Pedrini, 2010).

Based on the FRASOR framework, Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) developed their studies aiming to analyze qualitatively the validity of social, environmental and economic sustainability. The authors used a five-step process for qualitative validation including: conceptual and operational definition; construct validity (involving content and face validity, and reliability); and predictive validity. Both authors concluded favorably as to the qualitative validity of social and environmental sustainability and their components, as assumed by the FRASOR framework.

Despite the publication of other studies focusing on the FRASOR framework (Munck; Galleli, 2014; Munck, 2013), no research so far has used a quantitative approach or discussed the validity

of its constructs and their interrelationships as a whole. From such considerations the following research question emerges: how consistent and valid are the relationships proposed by the FRASOR framework, as well as its own configuration? This study aims to analyze and discuss Munck *et al.'s* (2011b) framework using a structural equation modeling (SEM) approach.SEM comprises analyses of convergent and discriminant validity, and of composite reliability (Hair Jr; Ringle & Sarstedt, 2011). Qualitative and quantitative validation procedures are not considered competing or excluding, but complementary. It is argued that not one of the two approaches in itself is sufficient to completely understand a particular circumstance of reality (Minayo & Sanches, 1993). At all stages of research, qualitative and quantitative methods can be mutually beneficial, even for theory confirmation (Deshpande, 1983). Therefore, we included in our analyses discussions brought by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014).
In qualitative research, on the one hand, validity is a delicate matter, since developing qualitative validity standards is somewhat challenging (Whittemore; Chase & Mandle, 2001). On the other hand, in quantitative research validity enjoys higher levels (though not always unquestionable) of credibility, largely because of its greater scientific objectivity (Martins, 2004). Despite these differences, Ollaik and Ziller (2012) ensure that both quantitative and qualitative studies seek to demonstrate that they are credible, reliable and valid, that is, that the evidence found provides the necessary support for their conclusions.
When it comes to theoretical models or frameworks, structural equation modeling estimate the strength of all the associations between the variables that make tem up (Maruyama 1998). Therefore, this study aims to advance previous studies and to increase the knowledge on this issue in management science, using a research design rarely used in studies in the field (Chow & Chen, 2012; Vinodh & Joy, 2012). SEM's potential is considerable, since it is a powerful analytical tool to study complex relationships, providing a comprehensive reference framework that estimates them and incorporates specific properties for measuring latent constructs (Hair Jr; Black & Babin, 2009).
The paper is structured as follows: first we discuss the framework for organizational sustainability; then, its qualitative validity; next, we present the methodological procedures; finally, we present an analysis of the results and our final considerations.

2. A REPRESENTATIVE FRAMEWORK FOR ORGANIZATIONAL SUSTAINABILITY (FRASOR).

Having confirmed the absence of a comprehensive, consolidated theoretical framework for understanding and acting on organizational sustainability, Munck *et al.* (2011b) proposed their own framework - FRASOR. It encompasses the specificities and processes required for organizational sustainability to happen. The authors see organizational sustainability as a strategic corporate goal. They searched for a theory on corporate procedures and actions that would be able to qualify, categorize and guide sustainability principles within the organizational context. Thus they combined theories such as Organizational Action (Maggi, 2006), the logic of competences (Mills; Platts; Bourne & Richards 2002) and the Triple Bottom Line (TBL) integrative approach (Elkington, 1999).
The theory of Organizational Action, as proposed by Maggi (2006), is a theory of both social and rational action. Social action refers to actions by one or more individuals meant to influence the actions by other individuals. Thus, organizational action concerns both individual and collective

active processes. It is a macro-level process resulting from numerous sub processes, influenced both by external and internal factors. It contemplates intrinsic and mutual relationships between organizational procedures and the external environment, between organizational and social actions. This is something essential in the quest for sustainable development and OS.
Searching for theories proposing concepts to foster consistency and coherence to organizational actions, the authors used the logic of competences. Competence is defined as a collective, high-quality know-how that represents a systemic operationalization of resources in view of the corporate objectives and strategies, and environmental influences. In this context, organizational action can be translated as an organizational competence, as it enables an objective description and efficient organization of procedures in terms of the desired outcomes. "competence, therefore, means efficiency, that is, the best possible use and coordination of resources. It is a means to promote and verify effectiveness in performance and decision making" (Munck *et al*., 2011b, p.152).
Based on Mills *et al*.'s (2002) study, Munck *et al*. (2011b) propose a hierarchical classification of organizational competences that can be developed and promoted. Mixed with the theory of organizational action approach, these competences are described in Table 1.

Table 1 – A simplified categorization of organizational competences

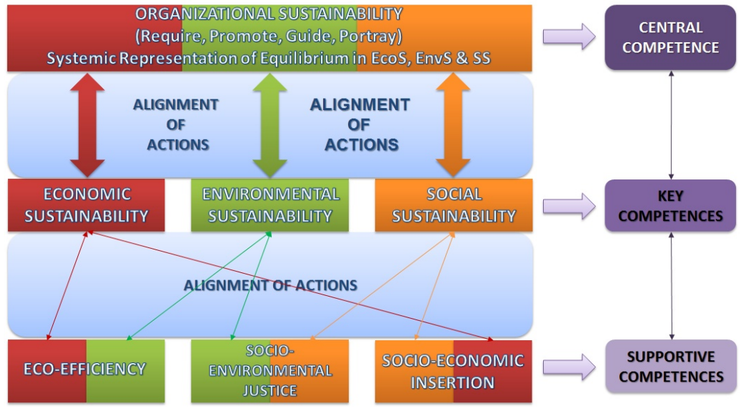
Categories of Organizational Competences	
1 - Core Competences	A corporate action that is essential for the survival of the company and fundamental to its strategy.
2 – Key Competences	A small number of essential actions, usually between three and six, that are expected to be found and developed in each business unit of the corporation.
3 – Supporting Competences	A validated organizational action that can support other actions essential to the architecture of competences.

Source: Munck et al. (2011b, p.151)

It should be stressed that the concept of organizational competences refers to an organization's ability to provide sufficient economic returns and to add social value to individuals. This concept also incorporates the Triple Bottom Line precepts, in addition to the requirement of not compromising the environment.
To appropriately classify a company as sustainable, Munck *et al.* (2011b) recommend using the triple bottom line approach (Elkington, 1999). The authors point out that organizational sustainability is only one of the forms of sustainability that potentially enable achieving systemic sustainable development. Thus, they propose three key competences to bring about OS: Economic Sustainability (EcoS), Environmental Sustainability (EnvS) and Social Sustainability (SS).
These three pillars of organizational sustainability coexist as cyclical and dynamic phenomena, whose inter-relationships help developing mechanisms to verify an organization's sustainability. In order to operationalize and enable OS, Munck *et al.* (2011b) propose three supporting competences: Eco-efficiency, Social-Environmental Justice and Social-Economic Inclusion.
For the authors, these concepts represent objective actions that can be analyzed based on their intrinsic resources, and measured by indicators of how successfully the core elements of OS have been achieved. These indicators should be consistently developed in association with the outcomes of each of the six competences, which, in turn, are defined based on the reality of each organization by means of established standards.

When validated, the three supporting competences yield a systemic organizational balance indicating that the three sustainability forms underlying OS have been successfully achieved. In its turn, OS should contribute to a better balance of interests related to each form of sustainability. These, based on the assumptions of organizational action, even if unconsciously translate an understanding of collective development, with shared, coordinated goals in the context of cooperation (Munck *et al.* 2011b).
In summary, Organizational Sustainability is understood as a core competence, made out of three interconnected key competences: Economic Sustainability, Environmental Sustainability and Social Sustainability. They, in turn, are made possible by the interaction and compliance of other supporting competences, namely: Eco-Efficiency, Social-Environmental Justice and Social-Economic Inclusion. It should be stressed that OS, as organizational action, should be articulated with social action and corporate strategy, as well as with a series of organizational resources. These competences, therefore, represent an organizational action that employs resources to build a relationship network that opens the path for organizational sustainability, taking into account external influences. This framework is illustrated in Figure 1. The descriptions of each of the six competences are shown on Table 2.

Figure 1 - Representative Framework for Organizational Sustainability



Source: Munck et al. (2011b p. 155)

The logic of competences provides guidelines to manage organizational sustainability requirements, as it directs objective actions consistent with the corresponding 'organizational actions' intended. Likewise, competences help define qualifications that will let organizations be classified as sustainable. The three competence groups identified are aligned, interconnected, and provide each other feedback; hence, the double arrows in Figure 1 (Munck *et al.* 2011b).
Munck *et al.* (2011b) have found that the competences indeed show the potential to guide sustainability management. But, if they are not aligned with their premises, they will generate disconnected processes that tend to lead to an absence of strategic cohesion. OS is viewed as a system comprised of and maintained by its subsystems Economic Sustainability (EcoS); Environmental Sustainability (EnvS); and Social Sustainability (SS). This, in turn, is maintained

by the Eco-efficiency, Social-Environmental Justice and Social-Economic Inclusion subsystems. In this mutual influence relationship, any change in one part of the system will clearly influence the whole.

Table 2- The six FRASOR competences

Organizational Sustainability
Core competence that guides systemic and balanced investments and results for the balance between EcoS, SS and EnvS. It is holistically inserted into the organization. It considers trade-offs and enables building a learning platform based on the interaction with all supply chain stakeholders. Its incorporation should be aligned with the environmental context and societal sustainable development principles.
Environmental Sustainability
Key organizational competence that fosters systemic and balanced investments and results from eco-efficiency and environmental justice. It is an OS subsystem that describes the efficient implementation of outcomes defined for their supporting competencies - environmental justice and eco-efficiency. Its objectives include prevention and minimization of negative impacts that may affect future generations' access to critical natural resources, as well as amplification of positive impacts generated by the organization in natural systems.
Economic Sustainability
Key organizational competence that fosters systemic and balanced investments and results from eco-efficiency and socio-economic inclusion. It is an OS subsystem that describes the efficient implementation of outcomes defined for their supporting competencies - eco-efficiency and socio-economic inclusion. Its goals involve the generation of wealth by and for society through providing goods and services, including the organization's ability to do business in a responsible manner, with recognized social and economic returns for those involved.
Social Sustainability
Key organizational competence that fosters systemic and balanced investments and results from socioeconomic conditions and environmental justice. It is an OS subsystem that describes the efficient implementation of outcomes defined for their supporting competencies - socioeconomic conditions and environmental justice. Its goals include management of the organization's impact on social systems due to its operation at local, national and global levels, providing equal opportunity, shared rights and responsibilities, and handling issues such as unemployment, social exclusion, poverty, organizational diversity, etc.
Eco-Efficiency
Supporting organizational competence that guides the interplay between economic and environmental goas and results, so that there is mutual and extended benefits to EnvS. Its outcomes involve providing products and services at competitive prices in order to satisfy human needs and promote environmental preservation.
Social-Environmental Justice
Supporting organizational competence that guides corporate actions in light of social and environmental justice, considering its distribution, procedures, interpersonal, informational and political dimensions. Outcomes are related to providing knowledge, training and opportunities for the corporation's workforce and stakeholders, in order to minimize environmental injustice and inequalities.
Social-Economic Inclusion
Supportive organizational competence that mobilizes resources to foster a continuous development of human capital (corporate partners) and to promote social capital (the surrounding community). Its outcomes are related to organizational strategic actions in individual and community development, and to social and economic bases affected by choices made by individuals.

Source: Based on Munck et al. (2011b); Bansi (2013); Galleli (2013) and Moçato-de-Oliveira (2014).

As already mentioned, OS as defined in FRASOR by Munck et al. (2011), requires the alignment of strategy, competences and corporate goals. This alignment is assumed to be a dynamic adjustment of the organization to the environment. It can also be seen as a mechanism that mobilizes organizational resources, due to the inherent interactivity in strategic processes (Galbraith & Kazanjiam, 1986). It may act both as a process and as an outcome. In other words, in the FRASOR framework alignment is understood as the cohesion, adjustment and convergence of competences and demands from different dimensions: organization; processes; sub processes; and individuals. Thus OS, as an organizational action turned into a competence, should be connected to social actions, strategies, and a number of organizational resources.
From this standpoint, decisions guiding organizational sustainability activities occur primarily at the strategic level and are reflected in the tactical (where more timely decisions can also be made)

and operational levels. Corporate strategy and objectives are linked to the core competence OS and provide directions for organizational actions in the tactical levels, responsible for the key competences EcoS, EnvS, and SS; and in the operational levels, responsible for supporting these skills. These directions are focused on the management of competences and articulated by the configuration of resources needed. After the resources have been identified, they are mobilized and articulated, providing the supportive competences: Eco-Efficiency, Socio-Economic Inclusion and Social-Environmental Justice. These competences are then put into action, so that their own results enable achieving goals related to key competences EcoS, EnvS, and SS. In turn, when the key competences are successfully achieved, Organizational Sustainability will also be achieved. Defining and evaluating the expected results from each of these organizational competences create parameters to assess how well the organization is performing core sustainability activities.

3. QUALITATIVE VALIDITY IN FRASOR

The original development of the validity concept arises from quantitative methods; validity is how much a measure correctly represents the concept under study. In other words, it is the degree to which the measure is free from error (Ollaik & Ziller, 2012.) Whereas quantitative research is guided by causal determination, prediction, and data generalization, qualitative research seeks to understand and extrapolate similar situations (Golafshani, 2003). Hammersley (1992) emphasizes that, in qualitative research, reality is accessed through different perspectives on the phenomena under investigation. Therefore, in order to find weaknesses in the object of study, such research aims to present the analyzed reality, rather than to reproduce it. Mishler (1990, p. 417) argues that quantitative research aims for validity, while qualitative research is interested in validation processes; for that reason, validation is defined "as the social construction of knowledge."

Adapting the quantitative concept to qualitative research, checking validity means to determine if a research truly measures what the researcher intended to measure, and whether its methodological processes and its results are consistent (Adcock & Collier, 2001; Ollaik & Ziller, 2012). In addition, validity is based on the researcher's understanding about the phenomenon under investigation, rather than on instruments and technical approaches; thus, validity is relative to the purpose and circumstances of the research (Maxwell, 1992). The concept of validity is described by a variety of terms in qualitative studies. Thus, it is not a unique, permanent or universal definition, but a contingent construct, based on the processes and intentions of research methods and specific projects (Golafshani, 2003).

In order to analyze the qualitative validity of the FRASOR framework, Bansi (2013) and Galleli (2013) used Maxwell's (1992) typology of theoretical validity of constructs and Martis' (2006) conceptual validation and operational validation of models. As explained by Maxwell (1992), theoretical validity is the extent to which the theoretical construct developed in a research is likely to be applied to the empirical context, and thus can be considered credible and justifiable. There are two requirements to assign theoretical validity to a construct: validity of the concepts in the theoretical framework and validity of the relationships between these concepts. Martis (2006), in turn, differentiates conceptual validation from the operational validation of models. In his opinion, conceptual validation refers to the process of determining whether a model's underlying theories and assertions are appropriate, and whether the model's representation of the target

problem is reasonable. On the other hand, operational validation is the process of determining whether the model's behavior in empirical reality is sufficiently accurate to be applied.

Based on these concepts, Bansi (2013) and Galleli (2013) adopted "theoretical validation" for conceptual validation and "empirical validation" for operational validation as the guiding procedures in a unified validation process for FRASOR. The authors assume there is no absolute validity, but the potential for increasing validity levels, the more validation processes are applied to a model (MARTIS, 2006). Moçato-de-Oliveira (2014), based on studies by Gaskell and Bauer (2005), and Kirk and Miller (1986), sees qualitative validity as the confidence level, with which correct conclusions can be drawn from an analysis. Therefore, it refers to the consistency of the development process, which will ensure reliability for the results.

Searching the literature for qualitative validation processes to assess the theoretical and empirical validity of management models, Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) used an adaptation of the 'Interconnected Cycle of Qualitative Legitimation and Validation of Competence Models' developed by Munck, Munck & Borim-de-Souza (2011a). The authors describe a set of steps that must be followed in order to investigate the validity of competence models, with the following structure: conceptual and operational definition; construct validity (concerning content and face validity and reliability); and, finally, predictive validity.

Conceptual and operational definition determines the meaning of the concepts proposed by the management model, how they are defined and operationalized. Content validity indicates that the descriptors for the concept in the model are a representative sample of the target universe. Face validity determines that the concepts inserted in the model and required by the organization, when analyzed by the staff that develops them, are deemed appropriate. Reliability represents the level of accuracy with which the concepts in the model can be measured. Finally, predictive validity is secured when the management model and its concepts are found to contribute to improve individual and/or corporate performance (Munck *et al.*, 2011a).

The empirical research supporting the analysis of qualitative validity of FRASOR components made by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) was conducted in three organizations considered as references. Moçato-de-Oliveira (2014) evaluated a fourth organization. Data collection procedures were document analysis, in-depth interviews, and focus groups. Therefore, data analysis was based on experts' views, supported by theoretical confrontations and recorded information. Besides following the stages in the validation cycle, the authors used as a guide a data collection and data analysis script, including verification items for each one of the steps.

For the "conceptual and operational definition" category, the analyses have shown that the definitions for environmental, economic and social sustainability, in the context under analysis, clarify the process by which this meaning could be accepted as the most consistent. The analyses also show how their operationalization may be inserted into the researched model, so that observations and assessments can be made.

Content validity, the first category of construct validity, underwent an analysis to verify if the descriptors for social, environmental and economic sustainability (and for their components eco-efficiency and environmental justice) comprise a representative sample of the target universe. Face validity analyses confirmed that SS, EnvS, and EcoS, and the related competences required by the organization, are deemed appropriate after being analyzed by the employees who have to develop them. Reliability analysis (the third and final category of construct validity) showed how accurately and precisely social, environmental, and economic sustainability are measured.

Confirmation of content validity, face validity and reliability implied, concomitantly, the confirmation of construct validity.
In terms of predictive validity, the analyses showed that social, environmental and economic sustainability contribute to improve corporate performance in pursuit of organizational sustainability.
Granting validity to all the steps/categories in the interconnected cycle of qualitative validation, beginning with theoretical confrontations, analyses of documents, contents of focus group and interviews to guarantee a triangulation of methods, was a sort of "ripple effect". So, confirmation of one category ratifies the next one, converging into SS, EnvS and EcoS validity as recommended by FRASOR (Bansi, 2013; Galleli, 2013; Moçato-de-Oliveira, 2014).
Although the above-mentioned research studies do not cover FRASOR's entire structure, they permit inferences and advance knowledge on the model's validity. They show that, at various times, it was necessary to consider the model from a global perspective, rather than to focus on one component or another. In the next section we describe the methodological procedures used in this paper.

4. METHODOLOGICAL PROCEDURES

Given this paper's purpose to analyze and discuss a theoretical model already validated, using the approach of structural equation modeling (SEM), this research may be categorized as quantitative exploratory. A survey (Hair Jr; Babin; Money; Samouel, 2005) was done with a population intentionally selected. The instrument for data collection was a paper-and-pencil questionnaire and the statistical analysis procedures followed structural equation modeling (Maruyama, 1998; Hair Jr *et al*., 2009).
It is worth noting that using SEM to investigate sustainability is rarely done, hence the exploratory nature of this research. Vinodh and Joy (2012), also from an exploratory perspective, used SEM to outline the antecedents and consequences of sustainable production systems. Sánchez, Sotorrío and Díez (2011) developed a measurement model to measure the effects of socially-sensitive variables of corporate governance on the organization's social behavior. Hall and Wagner (2012), based on a comparison between management models and different stakeholders, investigate the role of innovation and models in integrating sustainability into organizational functions. These and other examples (e.g., Boehe & Cruz, 2010; Chow & Chen, 2012; Hong; Roh & Rawsky, 2012; Murovec; Erker & Prodan, 2012) testify how recent papers using this approach are, thus reinforcing its exploratory character.
The target population and sample were defined intentionally for reasons of accessibility. We selected undergraduate and graduate students who had some familiarity with the issue and, therefore, minimal conditions to provide accurate answers (Podsakoff; Mackenzie; Lee & Poksakoff, 2003). The population consisted of students from the School of Economics, Management and Accounting at the University of São Paulo, enrolled in the first term of 2013. The undergraduate respondents were required to be attending an elective course on "Business Management and Social-Environmental Sustainability." In total, 56 undergraduate students from different terms and courses participated. Graduate students were required to have enrolled on a course on "Business Strategies and Climate Change"; they totaled 18 students.

Data were collected in two days, during class periods in both cases. We collected 36 valid questionnaires, 25 from undergraduate students and 11 from graduate students. The research

instrument was based on studies by Munck *et al.* (2011b), Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014). The questionnaire had 54 statements and a 7-point Likert scale (Hair Jr *et al.,* 2005), where 7 stood for "I Completely Disagree", and 1 stood for "I Completely Agree".
First, we checked for missing values. The software used for the analysis, SmartPLS, reported them in the response frequency statistics concerning the respondent profile, namely their current term. Missing values did not exceed 11% and were probably due to the fact that the graduate student was a special case, or the undergraduate student was foreign.
In order to estimate the adjustment of the constructs and relationships in the FRASOR model, we used a structural equation modeling procedure based on the PLS (Partial Least Squares) technique. This technique has as its main advantages its applicability to small samples, the ability to estimate quite complex models (with many latent and observable variables) and less restrictive requirements concerning normality, and variable and errors distribution (Henseler; Ringle; Sinkovics, 2009). Also worth noting is its greater adequacy to models combining formative and reflective variables (Hair Jr *et al*., 2011), as is the case in this study.
Regarding the minimum sample size, the recommendation in the PLS-SEM literature is that it should be ten times the largest number of structural paths toward a certain latent construct in the structural model (Hair Jr *et al*. 2011). Despite the limitations of this rule of thumb, considering the Organizational Sustainability construct this study would require at least thirty cases. Since the number of valid cases was 36, the rule was obeyed. We could also use the bootstrapping technique with 30 cases and 500 samples.
Another advantage of the structural equation modeling approach, as compared to other multivariate techniques, is that it examines simultaneous a series of dependence relationships, using a single statistical approach to test the full scope of projected relations (Hair Jr *et al*., 2009). Furthermore, SEM provide researchers with much more flexibility as it enables using both formative and reflective measurement models, providing a more nuanced testing of theoretical concepts (Hair Jr *et al*., 2011). Such features attest the feasibility and appropriateness of using SEM to test the FRASOR theoretical framework, as it is made up of systemic relationships among its components.
The basic PLS algorithm follows a two-step procedure. First, measure reliability and validity are examined; next, the structural model's estimates are evaluated (Hair *et al*., 2011). Thus, the measurement model was evaluated (convergent validity, discriminant validity, and reliability) and items with low factor loadings were removed. The analysis was completed with the development of the structural model. After that, we compared our results to the studies by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014).

5. DATA PRESENTATION AND ANALYSIS

This section follows the stages in the PLS analysis. We present brief considerations on respondents' profile, on the evaluation of the measurement model and, finally, on the structural model and comparative analyzes.
The sample consisted of 56 percent males (average age = 27). Most were undergraduate students in management (63.9%) and accounting (5.5%); 25 percent were graduate students in management and other programs (5.6%). Most undergraduate students were in the last term (52%), but most graduates were at the beginning of the program (54.5%).

Out of the total, 83.3 percent of the respondents had never worked in any area related to sustainability, but 50 percent of them planned to do so as soon as they finished their programs. Participants seemed reasonably interested in the matter under study. Although the majority did not have any professional experience with it, a significant portion intends to try it. Yet all the students had considerable academic contact with the issue, since they were finishing undergraduate and graduate courses on sustainability.

5.1. Evaluation of the measurement model

The analysis of the measurement, or outer, model consists of assessing composite reliability, convergent validity, and discriminant validity for the measures of each construct and the relationships between them (Hair Jr *et al*. 2012).
As shown in the first column in Table 3, all constructs show a square root of the Average Variance Extracted (AVE) greater than 0.5, meeting the criteria prescribed by Chin (1998) and Hair Jr *et al*. (2009) to ensure convergent validity. This means that the sets of indicators represent a unique, single underlying construct (Henseler *et al*., 2009), i.e., all variables pertain to their specific construct. This shows theoretical consistency in the descriptors for each FRASOR component. The second column in Table 2 shows that composite reliability values (an estimate of internal consistency) for most of the constructs are above 0.7 (Henseler *et al*., 2009). Reliability is the degree to which the observed/measured result reflects the true result, that is, how much a measure is free from random error variance (DeVellis, 2011).

Table 3 – Square root of constructs' AVE and composite reliability

Constructs	AVE	Composite Reliability
Ecoefficiency	0,6100	0,6380
Social-Economic Inclusion	0.7065	0.7902
Environmental Justice	0.6996	0.7858
Environmental Sustainability	0.7236	0.7609
Economic Sustainability	0.6414	0.8026
Environmental Sustainability	0.7177	0.8390
Organizational Sustainability	0.6939	0.7853

Source: Authors' elaboration based on research data.

In Table 3, the highlighted Composite Reliability value for the "Eco-efficiency" construct (0.6380) indicates that a lack of convergent validity. In this sense, we could say that the variables defined for "Eco-efficiency" are dispersed along other constructs, implying that the construct is not solid. However, as can be seen, the value is considerably close to the threshold value (a 0.07 difference); thus, the construct should not be eliminated. Despite meeting the established criterion, this construct shows the lowest value for the AVE square root (0.61). Therefore, although it is not appropriate to rule out the model's convergent validity, it is advisable that future research reviews and adapts the "Eco-efficiency" construct, in order to increase attribute adjustment level.
Next, Table 4 (in the Appendix) shows the Cross-loadings Matrix, the basis for analysis of discriminant validity for the proposed model. Discriminant validity means that the indicators measured represent a single construct. The items on a scale should not load on or converge with items from a different scale (Hair *et al.,* 2009). According to the criteria we used, indicators associated to a latent construct should have higher loadings with it, than with the other constructs

in the model (Hair *et al.,* 2011). Thus, when loadings are high, it means that the construct is unique and able to capture a phenomenon that other measures fail to do. Considering the exploratory nature of this research, we defined a significance level of 10 percent ($p < 0.10$). Values in bold are the factor loadings for the indicators belonging to each construct. As can be seen, these loadings are higher than the others on the same line (which belong to other constructs). Therefore, it is possible to assign discriminant validity to the whole model. This means that the indicators defined are relevant and significantly associated to their respective construct. The indicators without numbers ("-") were eliminated from the model due to their low factor loadings, considering $t = 1.68$. All items show significant p-values ($p < 0.10$), except for items Q23EE, Q7SEI and Q43SEJ, whose values are highlighted in yellow. Constructs Social-Environmental Justice, Social-Economic Inclusion and Eco-efficiency, again, show potential problems with their indicators, although their factor loadings did not show any discrepancies. Anyway, it will be necessary to revise these constructs' composition in future studies.
Another aspect to be considered in the discriminant validity analysis is the Fornell-Lacker criterion, whereby a construct shares more variance with its indicators than with any other latent variable in the structural model. In statistical terms, the AVE square root for each construct should be greater than the highest correlation of this construct with any other (Chin, 1998; Hair *et al*. 2011). The values of the AVE square roots are in bold in Table 5.

Table 5 – Pearson's correlations of the latent variables.

	EE	SEI	SEJ	EnvS	EcoS	OS	SS
Eco-efficiency	**0.6100**	0	0	0	0	0	0
Social-Economic Inclusion	0.3907	**0.7065**	0	0	0	0	0
Social-Environmental Justice	0.573	0.4257	**0.6996**	0	0	0	0
Environmental Sust.	0.6323	0.5938	0.4094	**0.7236**	0	0	0
Economic Sust.	0.6662	0.5951	0.5556	0.6342	**0.6414**	0	0
Organizational Sust.	0.4572	0.7133	0.457	0.6598	0.6266	**0.7177**	0
Social Sust.	0.6258	0.6073	0.6339	0.5181	0.6597	0.5477	**0.6939**
Mean	5.89	5.47	5.77	5.88	5.37	5.57	5.99
Median	6.00	5.74	6.00	6.00	5.40	5.78	6.00
Standard deviation	0.70	0.94	0.83	0.85	0.89	0.87	0.70

Source: Authors' elaboration based on research data.

The values highlighted in yellow in Table 5 suggest the absence of discriminant validity among the constructs Eco-efficiency, Environmental Sustainability, Economic Sustainability and Social Sustainability. Although the "Eco-efficiency" construct deserves attention, as we mentioned above, we should keep in mind that this construct has a reflective association with both Environmental Sustainability and Economic Sustainability. In addition, the value found for the

correlation with Social Sustainability (0.6258) is very close to the established criterion (0.61). These finding mean that a relative association among these three constructs is expected: any changes in the EnvS and EcoS constructs will alter the "Eco-efficiency" construct. In terms of FRASOR, changes in the outcome standards for the Environmental and Economic Sustainability, for example, reflect changes in Eco-Efficiency, as well as Social-Environmental Justice and Socioeconomic Inclusion. The absence of discriminant validity, therefore, should not be confirmed in isolation: we should consider the theoretical background, together with these observations and the results in Table 4.

The value highlighted in orange (0,7133), likewise, indicates that there is no discriminant validity between Social-Economic Inclusion and Organizational Sustainability. It is necessary to point out again that Social-Economic Inclusion is indirectly associated to Organizational Sustainability; thus, these constructs are expected to be correlated. Similarly to the previous case, the short distance between the value of the AVE square root and the correlation value does not call for ruling out their discriminant validity. The value in red (0,6597) shows the correlation between Economic Sustainability and Organizational Sustainability. Although it is not significant, it shows the absence of discriminant validity and hence the need for a revision of these constructs in terms of their variables.

The explanations made so far, with minor exceptions, allow us to conclude in favor of convergent validity, composite reliability and discriminant validity of the measurement model under study. The model proposed by Chow and Chen (2012) addressing the economic, social and environmental dimensions (first order constructs) of corporate sustainable development (a second-order construct) also presented such results. The study conducted by Vinodh and Joy (2012), whose model establishes an association among EnvS, EcoS, and SS shows similar results, despite the use of a purification process for convergent validity analysis. Even though both studies were executed in different contexts and built with different associations, it is worth noticing that their basis is the same as in this current research: TBL. In this sense, the positive findings reinforce the relevance and consistency of the FRASOR framework for organizational sustainability management.

Regarding the descriptive statistics presented, it is worth noting that the construct “Social Sustainability” had the highest mean (5.99), while “Economic Sustainability” had the lowest mean (5.37). The low variation between these figures shows that, in general, the levels of agreement among respondents regarding the attributes were high. It is possible to infer, therefore, that the theoretical foundations of FRASOR also showed high levels of acceptance among respondents.

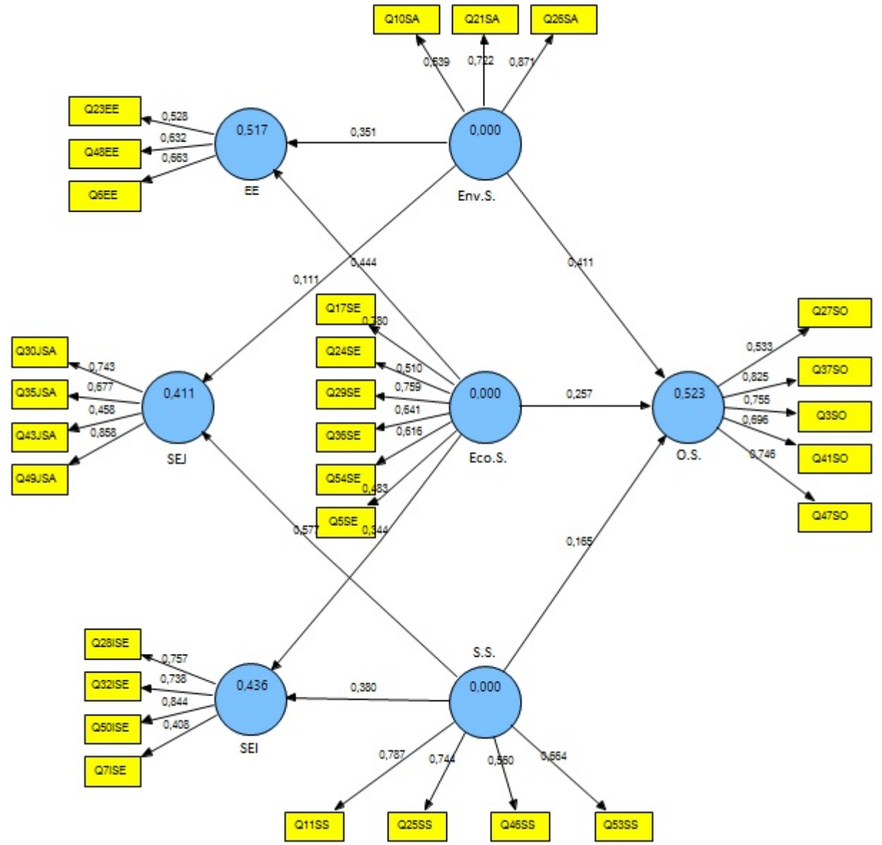
5.2 Assessment of the structural model

All the validity and reliability analyses previously done indicate that it is appropriate to keep all the parameters proposed in the measurement model (Outer Model). Once this was validated, it was possible to proceed to the evaluation of the structural model (Inner Model) (Henseler *et al.*, 2009). The structural model refers to the actual relationships between EE; SEI; SEJ; EcoS; SS; EnvS, and OS – non-observable variables present in FRASOR.

In the PLS-SEM method, the indicator that best reflects the adjustment of the structural model is the coefficient of determination (R^2), which represents the portion of explained variance of each endogenous latent variable (Hair *et al*., 2012). The value of R^2 should be sufficient to grant the model a minimum level of explanatory power; thus, the higher the better the adjustment of the

model and, consequently, the greater its explanatory power. Figure 2 represents the structural model; the R^2 values for the constructs are highlighted.

Figure 2 – Structural model for the relationships between the FRASOR variables[1].



[1] Note: We used software SmartPLS 2.0.M3. All coefficients are in standardized form and are highly significant (p <0.01), except for the coefficient between AI and AO. Significance was estimated via bootstrapping with N = 30 and 500 repetitions. The indicators have been omitted, but their factor loadings are in Table 4.
Acronyms: EE = eco-efficiency; SEJ = social-environmental justice; SEI = social-economic status; EnvS = environmental sustainability; EcoS = economic sustainability, SS = social sustainability; OS = organizational sustainability.

Figure 2 depicts the proposed structural model. “Eco-Efficiency”, “Social-Environmental Justice” and “Socioeconomic Inclusion” are reflective constructs for the three types of sustainability. This means that any change in the “Environmental Sustainability”, “Economic Sustainability” and “Social Sustainability” constructs will affect them. Not only in statistical terms (for example, changes in the questionnaire concerning these constructs), but especially regarding the theoretical implications. For example, modifications in the necessary resources for Social Sustainability will consequently entail changes in resources directed to Social-Environmental Justice and Socioeconomic Inclusion. The three forms of sustainability are formative constructs for "Organizational Sustainability", which means that any variation in EcoS, EnvS, and SS will affect OS. Accordingly, the failure to achieve EcoS defined results, for example, leads to a failure in OS.

Values attached to the constructs EE; SEI; SEJ, EcoS, SS, EnvS, and OS are the R^2 values that explain the variations between one another. The interpretation is that 52.3 percent of the variations in OS are explained by variations in EcoS, SS and EnvS. Meanwhile, 51.7 percent of the variations in EE are justified by variations in EcoS and EnvS; 41.1 percent of the variations in SEJ are explained by variations in EnvS and SS; and 43.6 percent of the variations in SEI are explained by variations in SS and EcoS.

The values on the arrows represent the structural coefficients and show that SA substantially influences OS (0.411), as compared to EcoS(0.257) and SS (0.165). A similar result was found by Chow and Chen (2012) in their study conducted in China, with a sample of more than 300 valid cases. In this study, they obtained a 0.72 correlation between the social dimension and the “corporate sustainable development” construct; a 0.77 correlation with the economic dimension; and a 0.89 correlation between the environmental dimension and corporate sustainable development. The correlations in Chow and Chen’s (2012) and in our study show the same proportionality.

As for SEI, its variations are basically shared in a balanced way by the variations in EcoS (0.344) and SS (0.380). In turn, variations in the latent variable EE are shared relatively more by the variations in EcoS (0.444), than in EnvS (0.315), but with no significant discrepancy. But, in the case of SEJ, the discrepancy in the distribution was more expressive: its variations are shared to a greater extent by the variations in SS (0.577), than in EnvS (0.111).

The greater influence of EnvS on OS, as compared to EcoS and SS, and the disproportions found in the last two cases (specially the last one) contradict the theoretical assumptions considered by Munck *et al.* (2011b). According to the authors, each one of the key competences (SS, EcoS, EnvS) and the supporting competences (EE; SEI; SEJ) integrate the FRASOR model from a systemic, balanced perspective. However, the results and correlations found are not in line with this view, and suggest a lack of adjustment in the model. This fact shows the need for revising the survey instrument in search of possible systematic errors that should be eliminated. If the imbalance remains, conceptual revisions may be necessary to check whether this disproportionality is also present in the theoretical basis.

The approach used in this paper, structural equation modeling, can be technically compared to the research conducted by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014), in terms of their discussions on the FRASOR model’s validity. Whereas our research reports analyses of convergent validity, discriminant validity, and reliability, the aforementioned authors discuss the validity of the conceptual and operational definitions, content validity, face validity and reliability (comprising construct validity) and predictive validity. Some of these analyses correspond to and complement each other.

The conceptual and operational definition determines the meaning of the proposed concepts, the process for defining this meaning and for operationalizing each one of the concepts demanded in the management model. This step in the studies by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) can be compared to our results concerning convergent validity, as their focus is on the concepts, aiming to confirm whether the proposed sets of indicators represent a single and unique construct. These inferences are also pertinent to our observations on discriminant validity for the FRASOR model, since these values confirm that the indicator measures for a specific construct are different from the indicators for another construct. Besides being considered valid in both studies from a qualitative perspective, FRASOR conceptual and operational definition, in general, has also shown convergent and discriminant validity using a quantitative approach.

The next step in the analysis conducted by Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) is assessing construct validity, comprised of content and face validity, and reliability. The first two are unique to the target universe, that is, subjects to whom a model for sustainability management should be addressed. Given its considerable level of subjectivity, it does not correspond to any other validity granted by quantitative techniques. The third step in assessing construct validity – reliability - is found both in the previous studies and in ours. While for Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) reliability represents the level of accuracy with which the model’s concepts can be measured, in this paper we consider reliability as the estimate for internal consistency of the constructs. Basically, both types of reliability may be regarded as convergent analyses with an equivalent purpose, but with different perspectives: the first, qualitative, and the second, quantitative.

Finally, Bansi (2013), Galleli (2013) and Moçato-de-Oliveira (2014) conducted analyses on predictive validity, confirming that FRASOR and its concepts contribute to improve individual and/or organizational performance. Although this kind of validity has not been covered by our study, Chow and Chen’s (2012) study is perhaps the closest in the literature to present a favorable result. Based on Bagozzi (1981), the authors considered that predictive validity indicates the model’s ability to behave according to the theory. In the context of their study, this means that corporate sustainable development is significantly associated with a positive financial performance. In this sense, the model used by Chow and Chen (2012) is capable of contributing to organizational performance. Again, the quantitative and qualitative perspectives on predictive validity have the same purpose, and therefore can be considered as complementary.

6. CONCLUSIONS

The purpose of this study was to analyze and discuss the FRASOR framework developed by Munck *et al.* (2011b) using the approach of structural equation modeling (SEM). As this is an exploratory research, the evaluation of the measurement model through analysis of convergent validity, discriminant validity, and reliability, as well as the evaluation of the structural model, allowed us to draw some specific inferences both for future studies and for revisions of the FRASOR framework itself.

Initially, the analysis of convergent validity and reliability, even though they were acceptable for the whole model, showed the need to adjust the “Eco-efficiency” construct, so that its attributes have a higher degree of adjustment. This may be achieved by a review of the questionnaire used after on a closer look at the literature, specifically at the studies by Munck *et al.* (2011), Galleli (2013) and Moçato-de-Oliveira (2014). In case subsequent studies using revised versions

demonstrate that the construct still has indicators lacking adjustment, we recommend a review of the very literature that served as a foundation for the model.

Discriminant validity, as evidenced in the cross-loadings matrix, was assigned to FRASOR in its entirety. However, the *p*-values of some indicators from the Social-Environmental Justice, Social-Economic Inclusion and Eco-Efficiency constructs show that such indicators need to be reconsidered. Their review may help to improve adjustments between the other constructs reflexively associated to SEJ, SEI and EE; specifically, between Economic Sustainability and Organizational Sustainability, which, though not considerably, lacked discriminant validity.

In general, the explanations made so far let us conclude in favor of convergent validity, composite reliability and discriminant validity for the measurement model. Similar results from other studies, despite their different contexts and associations, reinforce the relevance and consistency of FRASOR's content.

The analysis of the structural model showed that variations in Environmental Sustainability have a greater influence on Organizational Sustainability, as compared to Economic and Social Sustainability. We have also evidenced a disproportionate distribution of the shared variations in Social-Environmental Justice. These results, to a certain extent, disconfirm the theoretical assumptions set by Munck, Munck and Borim-de-Souza (2011b), who view the FRASOR model as having systemic, balanced relationships among its concepts. Therefore, it is once again necessary to review the research instrument to seek potential systematic errors that should be eliminated. In case the trend towards imbalance remains, a conceptual revision of FRASOR is suggested.

After discussing analyses of the measurement and structural models, we compared our results to Bansi's (2013), Galleli's (2013) and Moçato-de-Oliveira's (2014) regarding FRASOR's qualitative validity. We noticed that some of these analyses correspond to or complement each other, in line with recommendations regarding quantitative and qualitative methods. Our results confirm that it is possible to apply FRASOR to the organizational context. They also reinforce the consistency and coherence of the concepts present in the model, as well as the need for managing its dimensions from a holistic, integrative and systemic viewpoint when addressing sustainability. Using OS consistent conceptual basis ultimately facilitates its materialization inside the organization.

Still, it is worth reminding that phenomena related to organizational sustainability are still undergoing definition in the management field. Any theoretical framework still requires continuous improvement, application and validation before it may be put into effect and institutionalized in academia and corporations. This research has made advances in this direction, but its limitations must be overcome by future studies.

In terms of limitations of the study, we must mainly recognize that sustainability itself represents a complex issue, and that the FRASOR structure is also quite complex. Because of that, respondents may have confused and misinterpreted some items on the questionnaire. Thus, as already emphasized, the need for revisions, both of the questionnaire and the indicators defined for each construct, in search of greater simplicity. This would enable removing potential systematic errors, providing more robust values in convergent and discriminant validity, as well as reliability.

Another limitation is the sample size, too close to the minimum required. Future studies should use larger samples in order to obtain even more consistent results. Other target populations should also be defined, such as corporations, so as to yield results closer to business reality. We also suggest including moderating variables in the research instrument, such as company size, its

industry and how long the firm has been in operation. Designing and comparing competing models is also a suggestion for future research, especially models where the nature of the associations between constructs (formative or reflective) is modified. As stated above, this issue calls for scientific refinement; empirical research such as ours may contribute in this regard.

ACKNOWLEDGEMENTS

We thank the Brazilian governmental agencies CAPES and CNPq for its support.

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APPENDIX

Table 4 – Cross-loadings matrix.

Constructs	Indicators	CONSTRUCTS							*p*
		EE	SEI	SEJ	EcoS	SS	EnvS	OS	
Eco-efficiency	Q6EE	**0.6626**	0.2573	0.5446	0.4634	0.4531	0.4773	0.2814	0.0185
	Q23EE	**0.5276**	0.2712	0.0284	0.4044	0.4023	0.3519	0.3766	0.1561
	Q38EE	-	-	-	-	-	-	-	-
	Q45EE	-	-	-	-	-	-	-	-
	Q48EE	**0.6317**	0.168	0.4502	0.3211	0.2464	0.2871	0.1534	0.0121
	Q51EE	-	-	-	-	-	-	-	-
Social-Economic Inclusion	Q7SEI	0.0102	**0.4077**	0.0054	0.1503	0.0759	0.081	0.2278	0.114
	Q1SEI	-	-	-	-	-	-	-	-
	Q19SEI	-	-	-	-	-	-	-	-
	Q28SEI	0.3752	**0.7574**	0.3732	0.4455	0.458	0.5759	0.6148	0.0000
	Q32SEI	0.3229	**0.7379**	0.3017	0.5216	0.3741	0.3637	0.3651	0.0000
	Q50SEI	0.2652	**0.8437**	0.3615	0.4575	0.6107	0.4899	0.6853	0.0000
Social-Environmental Justice	Q8SEJ	-	-	-	-	-	-	-	-
	Q12SEJ	-	-	-	-	-	-	-	-
	Q18SEJ	-	-	-	-	-	-	-	-
	Q30SEJ	0.4117	0.4098	**0.7433**	0.3759	0.5563	0.3465	0.4845	0.0000
	Q35SEJ	0.3111	0.2221	**0.6774**	0.2414	0.3934	0.1792	0.1874	0.0000
	Q43SEJ	0.1817	0.322	**0.4579**	0.2497	0.1558	0.0945	0.1535	0.1247
	Q49SEJ	0.5854	0.2786	**0.8584**	0.6136	0.5203	0.4048	0.3452	0.0000
Economic Sustainability	Q5EcoS	0.2715	0.3411	0.1979	**0.483**	0.2367	0.4391	0.4218	0.0495
	Q13EcoS	-	-	-	-	-	-	-	-
	Q17EcoS	0.5717	0.3755	0.4272	**0.7795**	0.3642	0.5418	0.4844	0.0000
	Q22EcoS	-	-	-	-	-	-	-	-
	Q24EcoS	0.1826	0.3208	0.2367	**0.5103**	0.3419	0.2056	0.1373	0.0253
	Q29EcoS	0.5009	0.5881	0.3404	**0.7592**	0.6172	0.4369	0.648	0.0000
	Q31EcoS	-	-	-	-	-	-	-	-
	Q36EcoS	0.5603	0.3395	0.588	**0.6413**	0.5301	0.4325	0.1988	0.0003
	Q54EcoS	0.3363	0.2181	0.3355	**0.6159**	0.3798	0.2953	0.3001	0.0068
Social Sustainability	Q4SS	-	-	-	-	-	-	-	-
	Q11SS	0.4389	0.6224	0.3343	0.5149	**0.7866**	0.4995	0.5217	0.0000
	Q16SS	-	-	-	-	-	-	-	-
	Q25SS	0.4466	0.4327	0.5735	0.4339	**0.7437**	0.4551	0.459	0.0000
	Q34SS	-	-	-	-	-	-	-	-
	Q40SS	-	-	-	-	-	-	-	-
	Q46SS	0.1856	0.2927	0.2881	0.3291	**0.5601**	0.166	0.1908	0.0100
	Q53SS	0.6298	0.2679	0.5517	0.5486	**0.6636**	0.2148	0.2545	0.0054
	Q2SA	-	-	-	-	-	-	-	-
Environmental Sustainability	Q10EnvS	0.3467	0.1304	0.3164	0.4676	0.1563	**0.5394**	0.2826	0.0201
	Q14EnvS	-	-	-	-	-	-	-	-
	Q21EnvS	0.4224	0.5611	0.1204	0.3751	0.3687	**0.7223**	0.656	0.0000
	Q26EnvS	0.5771	0.5202	0.4503	0.5463	0.533	**0.8707**	0.4632	0.0000
	Q39EnvS	-	-	-	-	-	-	-	-
	Q42EnvS	-	-	-	-	-	-	-	-
Organizational Sustainability	Q3OS	0.2379	0.4417	0.2507	0.334	0.3515	0.4815	**0.7549**	0.0006
	Q9OS	-	-	-	-	-	-	-	-
	Q15OS	-	-	-	-	-	-	-	-
	Q20OS	-	-	-	-	-	-	-	-
	Q27OS	0.2127	0.2709	0.1737	0.342	0.2866	0.1433	**0.5327**	0.0416
	Q33OS	-	-	-	-	-	-	-	-
	Q37OS	0.2374	0.6476	0.3419	0.3969	0.4692	0.4996	**0.8251**	0.0005
	Q41OS	0.3407	0.3772	0.2687	0.3301	0.2149	0.4645	**0.6957**	0.006
	Q44OS	-	-	-	-	-	-	-	-
	Q47OS	0.5128	0.6638	0.4842	0.7075	0.5378	0.6106	**0.7464**	0.0066
	Q52OS								

Source: Prepared by the authors based on research data.

www.business-systems-review.org

Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S.Lab International Symposium

A Framework for Analyzing the Causes of Emotive Experience

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Submitted: April 30, 2014- Published: August, 20, 2014
DOI: 10.7350/BSR.D13.2014 – URL: http://dx.medra.org/10.7350/BSR.D13.2014

ABSTRACT

This paper proposes a framework for analyzing the causes of emotive experience (FACEE). The proposed framework is a method for analyzing emotive experiences based on their emotive cause. The framework allows you to identify the specific structure of the emotive experience clarifying its elements including the emotive cause, the subject and the object of the experience. Today, industries are turning their attention to emotive experience design. It is considered to be a key factor for products and services throughout their lifecycle including development and marketing. Previous studies conducted analysis of emotive experiences and brought about findings in how they affect people's behaviors. In this study, we focused on the mechanism and the system structure of individuals' emotive experience. We analyzed 105 emotive experiences and systematically extracted their emotive causes. A total of 11 emotive causes were identified, and the validity of the definition was supported by the results of the previous studies. We also found the elements and their interactions structuring an emotive experience. Using those findings, we developed a framework (FACEE). The FACEE was verified by analyzing three cases of emotive experiences. The success of the FACEE implies its application to product and service emotive experience design in the future.

***Keywords**:* emotive experience, cause, added value, consumption activities.

1. INTRODUCTION

An emotive experience can result from watching a movie or a beautiful scene. The emotive experience can affect the mind, philosophy, and behavior. A child may start to play soccer after an emotional response to the world cup. An emotive experience affects behavior. Although common to all, the state of being emotionally moved does not possess academic definition. We focus on the state of being emotionally moved and define it as the state where an individual's paradigm shifts or a conversion occurs.

Previous studies revealed the efficacy brought about by emotive experiences. Tokaji investigated seven items concerning "the emotive experience which changed own behavior" by surveying 91 college students using a questionnaire (Tokaji, 2001). The seven items included the phenomenon; age at the time of the experience; a reason; how they felt at that time; how they feel now; and the change in their feelings, if any. The study showed that an emotive experience could affect motivation. Maslow had previously demonstrated that a peak experience, which is an emotive experience, creates feelings of happiness and the effect is continued (Maslow, 1959; 1961).

We focus on emotive experiences that affect motivation and provide a sense of happiness. Moreover, we consider that an emotive experience affects consumer behavior.

In recent years, many markets tend to be saturated although the product or service is highly efficient in many functions (Ministry of Economy, Trade and Industry, 2013). Such markets require new added value. Consumers' interest in spiritual richness rather than material richness was reflected by the success of "Drink 1, Give 10 Campaign" launched in Japan (Volvic, 2013). It is a collaborative project of Kirin Beverage Company, a beverage manufacturer and a member of the Japan Committee for UNICEF. The project donates a portion of sales to well-digging projects in Africa. In "Marketing 3.0," Kotler says, "consumers will be treated as human beings who are active, anxious, and creative. Then they will request more participation in value creation and demand their deepest anxieties and desires - not traditional needs and wants – be identified and fulfilled" (Kotler, 2000; Kotler & Nancy, 2005). Therefore, we suggest that another value is required with respect to consumption activity in addition to the existing multiple functions. This new value affects human emotion and is human-centered.

Emotion is a central component of consumer behavior research. Substantial research on the cognitive process had used an objective numerical value to measure consumer behavior by the 1980s (Fishbein, 1963; 1975; Bettman, 1979). Since then, the research that has focused on the emotion process has increased. Cohen and Areni advocated a model in which consumer behavior is formed while a cognitive and emotional route conduct an interaction. They indicate that both intellectual evaluation and emotional evaluation specify actual action (Cohen & Areni, 1991). Moreover, Kahneman demonstrated that intuition often stimulates effective decision-making by distinguishing the rational behavior that arises after consideration of intuition (Kahneman, 2003). Thompson et al. reported that emotional motive exceeds rational motive (Thompson et al., 1989). These findings show that affecting people's feelings is required to ensure future consumption activity.

We consider that this anthropocentric new value can be created by adding emotive experience. A positive emotive experience produces feelings of motivation and happiness. This effect can be applied to consumption activities and has the potential to transform an activity into a more positive one by adding a deeply emotional value. We consider that emotional consumption activity provides positive feelings following a buying behavior because previous studies show that remembering emotive experience creates positive feelings.

Emotional value is the value accompanied by emotive experience. We consider that this reinforces the experience value that Schmitt advocated (Schmitt, 1999; 2010). The study of behavioral economics focuses on customer experience marketing advocated by Schmitt. The customer experience is not based on the material and cash value that a product or service represents, but an effect acquired through the use experience and the mental and sensuous value of satisfaction throughout the lifecycle of the goods or services. With respect to customer experience marketing, Schmitt separated experience value into five categories and showed that experience is the basis for marketing. The five experience values are described. The first is SENSE. This experience value appeals to one or more of the five senses. The second is FEEL. This experience value stimulates emotions. The third is THINK. This experience value stimulates intellect or curiosity. The fourth is ACT. This experience value reflects interaction with a physical product or the adoption of a new lifestyle as a result. The fifth is RELATE. This experience value is relevant for a belonging to a specific culture or a group. Schmitt called these the five strategic experiential modules (SEM) collectively. SEM highlighted the significance of the experience during consumption. However, SEM represented a broad experience value classification and did not reflect specific experience. Then Schmitt described customer experience management (CEM) as the process of controlling strategic value experiences. CEM is composed of five stages: an analysis of a customer's experience values, the construction of an experience value platform, the design of brand experience value, the construction of a customer interface, and the measurement of continuous innovation. These stages do not provide specific methods for analysis and construction. By providing specific methods and a framework to create emotive value, we consider that this study could eventually contribute to the field of behavioral economics.

The correct design of an emotive experience to produce or add emotional value is significant. However, limited existing research addresses emotive experience. Gabrielsson and Lindstrom conducted research on Strong Experiences with Music and administered a survey to 900 individuals (Gabrielsson, 2001; Gabrielsson & Lindstrom, 2003). They described the following: “We also happened to meet people who told us, typically in private, about exceptional experiences of music which had affected them deeply.” The authors clarified that emotive experience with respect to music was influenced by seven categories: general characteristics, physical reactions and behaviors, perception, cognition, feelings/emotions, existential and transcendental aspects, and personal and social aspects. Moreover, the authors reported that each category had a subcategory. However, it was not shown how these categories related to or constituted emotive experience. Madrigal analyzed the feelings of the basketball spectator while watching a basketball game (Madrigal, 1995; 2003). The spectator reported that the feeling of enjoyment influenced satisfaction and motivation. Matsuoka and others also studied emotive experience (Matsuoka, 2004). They analyzed emotive experience with respect to philosophy, aesthetics, psychology, and semiotics. The authors showed that the factors of emotive experience were surprise and empathy and both were independent reactions. Moreover, they reported that the factor of surprise was originality and the factors of empathy were semantic understanding and

usefulness. Consequently, the emotive experience model about a product without a story was proposed. Tokaji and others performed a questionnaire concerning emotive experience (Tokaji, 2001). They reported that the effects of emotive experience were motivation, the renewal of a cognitive framework, and thinking and personal acceptance such as empathizing with others and gaining a deepening understanding of others. The authors based the model of the emotional story on this knowledge.

The previous research analyzed specific emotive events such as listening to music and watching sporting events. Therefore, the emotive experience does not reflect a holistic structure. It is difficult to clarify the relationship among influential factors, such as the attributions of people, the situation at the time of occurrence, and to understand the relationship between the influential factors and composition elements of emotive experience. Skinner also commented on these inherent difficulties, which are common in the field of emotive experience research (Skinner, 1953).

To overcome this difficulty, we captured an emotive experience as a system and developed a framework to show the whole picture of the experience in a structured manner. Not having limited the boundary to any specific emotional events, the framework is usable for every emotive experience. This paper presents the development of the framework and the process and the result of its evaluation test on actual cases of emotive experiences. The eventual goal of this study is to design the emotional value using the framework. To achieve the goal, we will further work on designing the emotional value and add it to products and services and conduct validation.

2. THE DEVELOPMENT OF A FACEE

This section explains the development of a framework for analyzing the causes of emotive experience (FACEE). The framework is usable for all emotive experience. The framework is a method for analyzing emotive experiences based on their emotive cause. The framework allows you to identify the specific structure of the emotive experience clarifying its elements including the emotive cause, the subject and the object of the experience.

We conducted an experiment to find out the elements and their interactions structuring emotive experiences (Nishio et al., 2013). We identified a total of 11 emotive causes. The validity of the definition was supported by the results of the previous studies. We also found that the subject and the object of the emotive experience are classified in four groups, respectively.

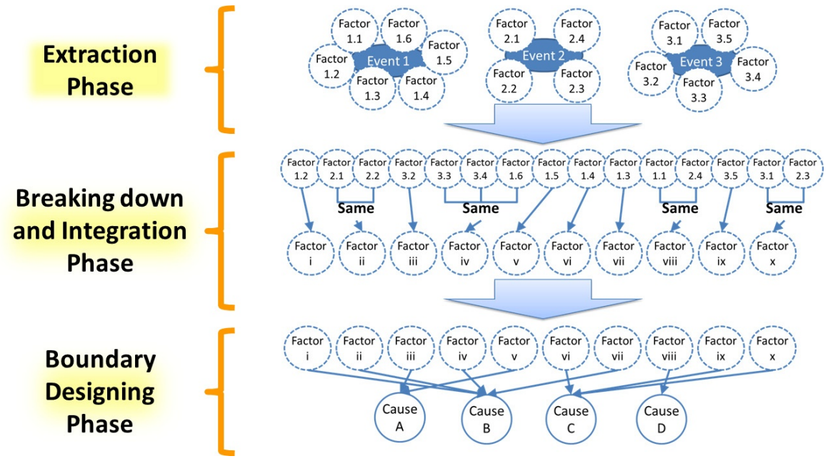
2.1 A summary of the analysis of personal emotive experience

In the experiment, participants analyzed emotive experiences and systematically abstracted emotive causes independent of the emotive event. The aim of this experiment was to find out the mechanism of emotive experience and to confirm the commonalities of emotive causes. The emotive cause is the important factor or factors within an emotive experience. People experience many events in life, and they are not perceived as emotive experiences unless one or more emotive causes are present. Our hypotheses was that the number of emotive causes was quite limited. Multiple emotive events could be associated with one particular emotive event. For example, people identify beauty as an emotive cause when looking at flowers, stars, sunset and so on.

We selected people with various characteristics as participants to collect data on various emotive events. A total of 21 individuals participated as experimental subjects, 10 women and 11men

ranging from 20's to 50's. Occupations of participants were diverse. They were student, businessman, reporter, engineer and teacher, to name a few. Some were married and others were not. Some were parents and others were not. We conducted a personality assessment on the participants and the result showed no bias towards any particular personality trait.
We asked the participants to work individually and each participant took approximately two hours to complete the experiment.
The experiment was conducted in the following process. In extraction phase, the participants were requested to recall five emotive events that were considered memorable experiences and identify the factors that moved their emotions as many as possible. In breaking down and integration phase, the participants were asked to compare the factors in terms of similarity by pair comparison. In boundary designing phase, the participants were requested to group the factors on the basis of similarity and to name each group. Thus the emotive causes were extracted from the individuals' emotive experiences.

Figure 1. Diagrammatic illustration of the experiment



2.2 Results

The total number of emotive experiences recalled by all participants was 105. By analyzing the experiences, we abstracted elements – emotional causes, the subject and the object of an emotive experience - and their interactions.

2.2.1. Elements of emotive experience

1) The Subject of emotive experience
The subject of emotive experience can be classified four groups.
1. Oneself

2. Others /other people
3. A thing
4. A circumstance

2) The object of emotive experience
The subject of emotive experience can be classified four groups.
1. Oneself
2. Others /other people
3. A thing
4. A circumstance

3) The emotive cause
The emotive causes were categorized by 12 types. One of them was empathy. Considering the nature of this factor, we put it aside and regarded the remaining 11 as the emotive causes. (The detail of the factor "empathy" is described in 2.3.)
The details of the 11 emotive causes are the followings.

a) Accomplishment
The reward, acceptance, or admiration that results from hard effort.
Emotive case: Passing a certificate examination.

b) Beauty
Delight from a sensuous stimulus.
Emotive case: Watching a beautiful sunrise. Tasting delicious chocolate.

c) Connection
Belonging to an organization or a connection with a person. Accepting connections with others.
Emotive case: The birth of a child.

d) Enlightenment
A clear understanding and acceptance by logic or inspiration.
Emotive case: Hearing advice that resolves a problem.

e) Harmony
Accepting balance with entities such as nature, society and others.
Emotive case: Singing in chorus. Team accomplishments.

f) Unity
Feelings united with the enclosed environment and accepting a precious state.
Emotive case: Listening to a concert or appreciating theatre.

g) Relief
Accepting escape from an undesirable situation. A feeling that infringes on the condition of resentment.
Emotive case: A movie storyline. Disaster relief activities.

h) Validation
Accepting something that has understanding and value.
Emotive case: Obtaining matrimonial consent.

i) Wonder

Feeling wonder for something beyond understanding.
Emotive case: The receipt of a surprising present.

j) Delight

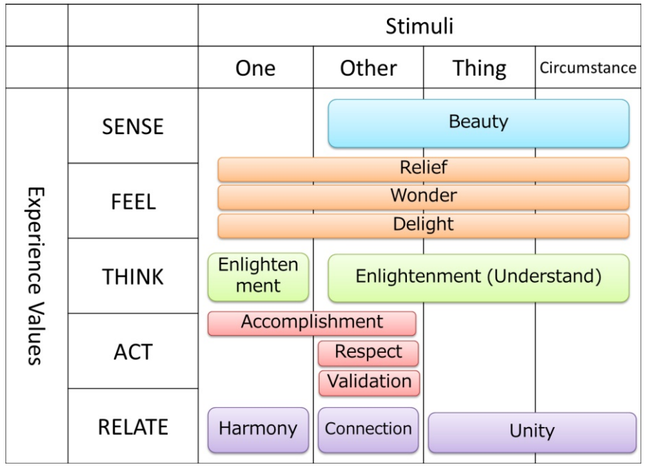
A positive emotion such as joy and pleasure concerning an expectation.
Emotive case: A marriage proposal.

k) Respect

Understanding, recognizing, and admiring an object.
Emotive case: A leading sports player.

We confirmed validity of the 11 causes by comparing the extracted emotive causes with precedence research. The precedence researches used for comparison were the large-scale results of an investigation into emotive experience or experience value, which has acquired generality.
The four precedence research studies used for comparison were the followings. First, Tokaji's survey concerning emotive experiences on 91 college students resulted in a list of 16 causes of emotive experiences (Tokaji, 2001). The second study used is a survey conducted by researchers at the University of Michigan Survey Research Center on the significance of experience value administered to 2000 Americans (Beatty et al., 1991). Out of the survey result, the researchers developed the list of values (LOV) consisted of 8 values. Thirdly,, this study called on the research by Bordwell, David and others on the experiences from which consumers find value. They conducted discernment interviews with 100,000 people (Bordwell, 1991), and found 15 values out of the result. Lastly, we compared the emotive causes with the five categories of experience value developed by Schmitt (Schmitt, 1999).
The results of above four previous studies are regarded as consistent with our findings. For example, the 11 emotive causes are contained in the Schmitt's five categories of experience values called "strategic experiential modules (SEM.)".

Figure 2. The relationship between emotive cause and SEM



2.2.2 Interactions among elements

1) Emotive experience always consists of three elements: subject, object and emotive cause. . Either the subject or the object of the emotive event could be an emotional stimulant.

   a) Subject

   b) Object

   c) Emotive cause

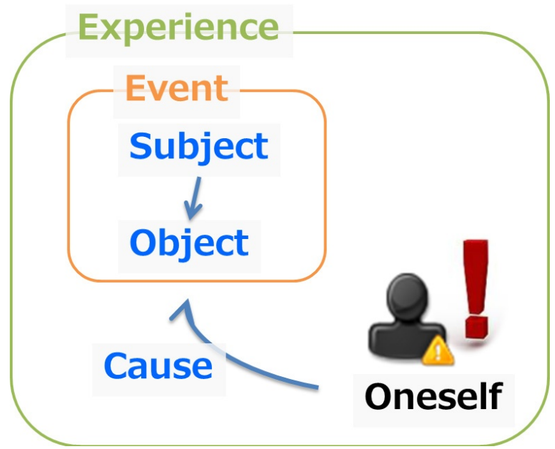
Thus, an emotive experience is caused by an emotive event and a personal experience with emotive causes results in emotional responses.
For example,

[Emotive event] A soccer player scores a goal.

[Emotive experience] I was happy when the player scored.

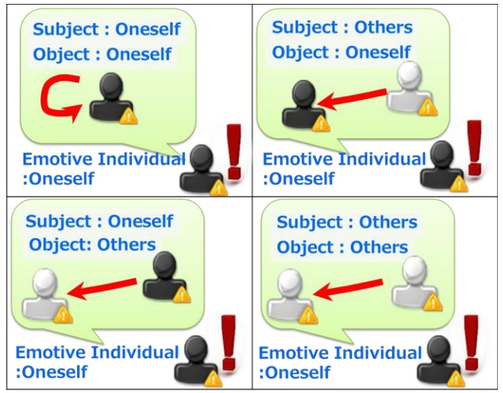
[Emotive causes] Delight, respect.

Figure 3. The relationship between emotive experience elements



2) An individual is an object of an emotive experience only when the individual is stimulated by the emotional event. It is always "you" who receives the stimulant and judges the emotive cause.

Figure 4. The relationship between an individual and another



2.3 Discussion

As described above, the emotive causes extracted in the experiment included "empathy." It was not applied to the values in precedence research. Therefore, we suggest that empathy plays a separate role in emotive experience. We consider that empathy is not a cause itself but a condition that brings the individual an emotive experience when he/she does not intervene in the emotive event. As shown in the lower right in the Figure 4, an individual is emotionally moved even when either of the actors in the emotive event are others. In this case, empathy with the emotive cause retained by the individual is the essential factor to develop the emotive experience. Another finding in the development of the emotive causes is that the causes are grouped into two categories: ones that contain expectation and the others that do not. This differentiation is relevant for emotive design because emotive causes without expectation must not be used when targeting the expectations of consumers. The grouping is shown in Table 1.

Table 1. The emotive causes that contain expectation and those that do not.

Cause that Contain Expectation
Delight, Relief, Accomplishment, Validation, Connection
Cause that Do Not Contain Expectation
Beauty, Wonder, Enlightenment, Respect, Harmony, Unity

Emotive events and experiences have been previously expressed in a scattered manner and with different degrees of abstraction. We consider that the emotive causes we identified allow viewing the emotive experiences from a common perspective and facilitate their analysis.

3. THE USE OF A FACEE

The FACEE that analyzes emotive events and that facilitates the arrangement of emotive experiences is proposed in this section. We describe the framework outline, the steps for using the framework and an example of how it is used.

3.1 The outline of the FACEE

The FACEE is developed based on the experimental results. Using the results in the previous section, all the emotive experiences could be represented in any one of the following sentences.

I am emotionally moved
because I feel A (emotive cause)
when B (subject) stimulates C (object.)

I am emotionally moved
because emphasize with A (emotive cause)
when B (subject) stimulates C (object.)

We place the subject of the act of emotive experience in the columns and the object of the act of emotive experience in the rows. The framework enables an analysis of any emotive experience to specify the subject and object of the emotive event and to plot the emotive cause appropriately. A total of 11 emotive causes can be allocated to any case. In the gray zone, "respect," "accomplishment," and "validation" are located only when either the subject or the object is personified.

Table 2. The framework for analyzing the cause of emotive experience.

		Subject			
		Oneself	Others	Thing	Circumstance
Object	Oneself				
	Others				
	Thing				
	Circumstance				

3.2 The steps for using the FACEE

1) List as many emotive experiences concerning an emotive event as possible. List them using the form "the subject carried out an action (for object)."
2) Compare the experiences with 11 types of emotive causes.
3) Create an emotive value chain analysis diagram. Write all the subjects and objects concerning the emotive experience and connect them with arrows. Write an emotive cause arrow with a dashed line to represent the exclusion of self and a feeling of empathy.
4) Then identify all of the emotive causes. Write the action or stimuli in the case of a judged emotive experience without self, and note the emotive experience between the subject and object.
5) Based on the Table 3, locate the emotive cause to the FACEE.

3.3 An example of the FACEE

The following illustrates an emotive event, watching a soccer game, as an example of the use of a FACEE.

First, the emotive experiences associated with watching a soccer game are listed. For instance, we find 11 experiences: the player added points for the team, I aided in a supporter role, the player protected the score, the player played fairly, the supporter played fairly, the team won the league title, the injured player did his best, I aided with team supporter, a losing player claimed that sometimes the best gain is to lose, the player passed the ball accurately, and a player's goal score. Next, these emotive experiences are compared with 11 emotive causes. A particular experience may fit several emotive causes. For example, the experience of "the player added points for the team" and" the team won the league title" fit the emotive cause of delight. The experience of "the team won the league title" fits the emotive cause of delight and accomplishment. Moreover, using 11 emotive causes, it is possible to recall more emotive experiences.

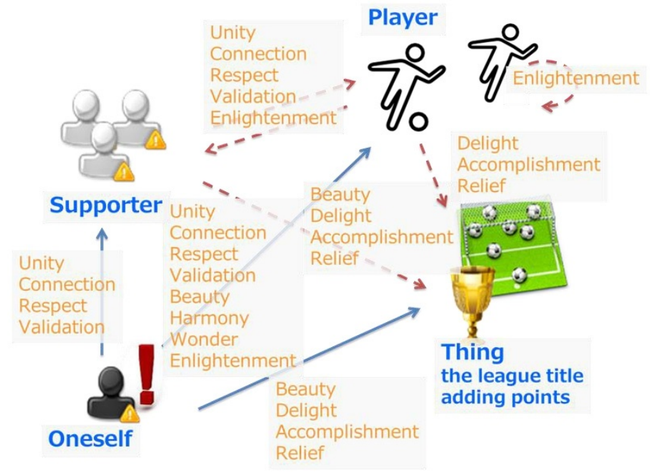
The results of a comparison of the emotive experience with emotive causes are presented in Table 3.

Table 3. The results of comparing emotive experience with emotive causes

	Emotive experience	
	Emotive causes	Emotive event
With expectation	Delight	The player added points to the team, The team won the league title.
	Relief	The player protected the score, The team won the league title.
	Accomplishment	The team won the league title.
	Validation	I aided in a supporter role.
	Connection	I aided in a supporter role
Without expectation	Wonder	The injured player did his best, A player's goal score.
	Enlightenment	A losing player claimed that sometimes The best gain is to lose.
	Respect	The player had protected the score, The player played fairly, The supporter played fairly, The injured player did his best, A player's goal score.
	Beauty	A player's goal score.
	Harmony	The player passed the ball accurately.
	Unity	I aided with team supporter.

Next, the stakeholders are recorded including self, others, thing, and circumstance for all emotive experiences. In this case, self, supporter, player, the league title, and adding points are written. Connect these stakeholders with arrows and locate the emotive causes. The direction of the arrow represents the direction of the emotive cause. Write an emotive cause arrow with a dashed line to represent no involvement of self and for the feeling of empathy.

Figure 5. The emotive value chain analysis of a soccer game.



Using the emotive value chain analysis, place the emotive causes in the FACEE for the soccer game.

Table 4. The result of emotive experience analysis about soccer game.

		Subject			
		Oneself	Others	Thing	Circumstance
Object	Oneself		Validation Respect Connection Unity		
	Others	Validation Respect Connection Unity Beauty Harmony	Validation Respect Connection Unity Enlightenment Harmony		
	Thing	Delight Accomplishment Relief Beauty	Delight Accomplishment Relief Beauty		
	Circumstance				

The emotive causes mentioned in the example are shown in Table 3. Using this framework, it is possible to design additional emotive experiences. This framework can confirm and analyze emotive experiences from a multiple perspectives.

- (Subject to object)
- (Self to self): I felt self-respect for assisting at a charity match.
- (Self to circumstance): I felt self-respect for collecting trash at the stadium
- (Others to circumstance): I felt respect for others for collecting trash at the stadium
- (Thing to self): I experienced beauty at the sight of the championship trophy.
- (Thing to others): I felt empathy and beauty when others experienced beauty at the sight of the championship trophy.
- (Thing to thing): I felt relief as the continuation of the team was decided by the championship.
- (Thing to circumstance): I felt oneness with the rooter's song resounding in the stadium.
- (Circumstance to oneself): I felt respect for myself for helping in the snow.
- (Circumstance to others): I felt respect for the player who played in the snow.
- (Circumstance to thing): I felt respect for those who finished the game in heavy snow.
- (Circumstance to circumstance): I felt relief because the stadium is protected from heavy snowfall.

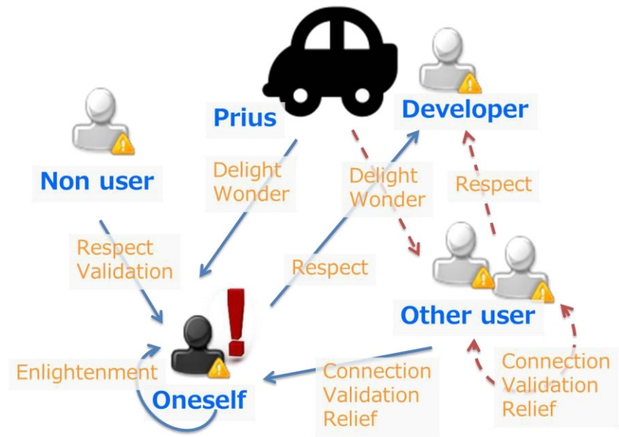
4. CASE ANALYSIS BY FACEE

In this section, we analyzed three cases of emotive experience (product, service, and entertainment) for verification of the framework. We verified in case analysis to frame, arrange, and recollect the emotive experience. Those who conducted the analysis were participants who went through the outline, the steps for using FACEE and the example described in the section 3.

4.1 Toyota Prius

The Prius, manufactured by Toyota Motor Corporation is the world's first mass-produced hybrid vehicle. It is the car developed with the concept that "it is comfortable for the earth and a person." The manufacturer raised fuel consumption performance to the limit and had a goal of reducing global warming CO2 emissions (Lave, & Heather,2002). The emotional value chain analysis and FACEE created by a participant are as follows (Figure 6).

Figure 6. The emotional value chain analysis of the Prius



The result shows that Prius provides emotive experiences that are structured by total of five subjects and objects (Prius car, oneself, Prius user, non-user and supplier) and nine emotive causes. In previous studies, extracted emotive causes have been limited to delight and wonder. When the framework is used, two or more emotive causes can be extracted. The result shows that emotive experience had occurred not only as a result of stimulus from the Prius model but also developer motivation and the respect from the individual who may or may not use a Prius. Using this framework, it is possible to show the relationship of each experience in connection with the emotive cause, which is not obtained from an interview or questionnaire.

Table 5. The FACEE of Prius.

		Subject			
Object		Oneself	Others	Thing	Circumstance
	Oneself	Accomplishment	Validation Respect Connection Relief	Wonder Delight	
	Others	Respect	Respect	Wonder Delight	
	Thing		Delight Accomplishment		
	Circumstance				

4.2 The hospitality of Ritz-Carlton

Ritz Carlton is a global hotel chain. The employees of Ritz Carlton are trained to do their utmost to ensure that guests' needs are met. The Ritz Carlton maintains the highest degree of customer satisfaction (Partlow,1993).

The result shows that Ritz Carlton provides emotive experiences that are structured by total of four subjects and objects (hotel, employees, oneself and other guests) and four emotive causes. An emotional value chain and FACEE analysis revealed that the emotive causes obtained from a hotel and those from employees were the same. Moreover, the emotional value chain analysis showed no arrows originating from self.

The Ritz Carlton distributes its employees a card called Credo representing the corporate philosophy. It is known that the philosophy is prevailing well among the employees. We consider that this explains the analysis result of the hotel and employees generating the same emotive causes. With respect to Ritz Carlton hospitality, employees concern with customer satisfaction before a customer issues a request. This is also reflected in the analysis results showing no arrows originating from self.

Figure 7. The emotional value chain analysis of Ritz-Carlton

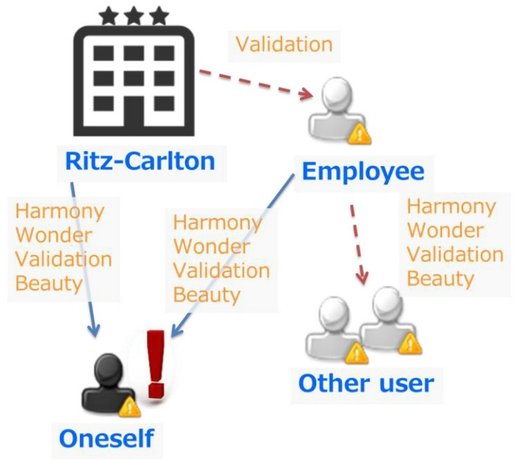


Table 6. The FACEE for Ritz-Carlton.

		Subject			
		Oneself	Others	Thing	Circumstance
Object	Oneself		Harmony Wonder Validation Beauty	Harmony Wonder Validation Beauty	
	Others		Harmony Wonder Validation Beauty	Validation	
	Thing				
	Circumstance				

4.3 The movie "*Titanic*"

Titanic is a movie that depicts a tragic love affair between a poor youth and a privileged daughter on the ill-fated, luxury liner Titanic (Titanic,1997). The emotional value chain analysis was conducted centered around the hero and heroine of the story. The emotive causes that arise between the two characters are reversed half way through the movie by the change in the external environment caused by the sinking of the passenger liner. Figure 8 depicts the case study.

This case is reported in the research of Tokaji and others (Tokaji, 2001). The movie extracts a negative emotive cause that occurs only fictionally and does not relate to self. The "Titanic" storyline describes negative emotive causes as contrary to emotive causes. For example, relief changes to uneasiness, accomplishment changes to frustration, delight is a heroic change, connection changes to separation, and oneness changes to devastation. Respect and validation did not represent change. We consider respect and validation with a partner as love in this story. The composition of reversing the emotive causes of the two characters in the second half of the story and providing emotive impression, confirmed the emotional value chain analysis and the FACEE.

Figure 8. The emotional value chain analysis of the movie "Titanic"

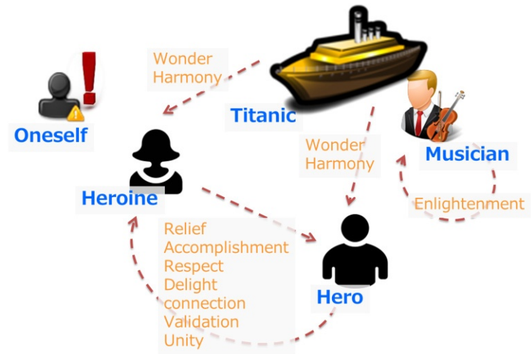


Table 7. The FACEE of the movie "Titanic".

		Subject			
		Oneself	Others	Thing	Circumstance
Object	Oneself				
	Others		Relief Accomplishment Respect Delight connection Validation Unity	Wonder Harmony	
	Thing				
	Circumstance				

4.4 Discussion

The case analysis verified the framework's ability to facilitate the arrangement and recollection of the emotive experience. However only emotive experiences with strong impression have been recallected and the analysis seemed to have missed out some emotive causes. We consider that is because the participants who conducted this case analysis had limited experience in using the framework and were not used to use it.

By repeating using the framework, all the emotive causes could be extracted in each example. For example, in the case of Prius, the emotive cause of enlightenment, beauty, harmony, and unity was not recollected. Enlightenment can be considered the experience of being conscious of environmental impact reduction from the fuel consumption display. Beauty can be felt from the beautiful exterior design. Harmony can be felt from the urbane design and unity provided by a secure seat. Therefore, when extracted emotive causes out of emotive experiences do not meet all the 11 causes, the 11 emotive causes may become a checklist for extracting more emotive experiences.

The emotive causes that result from the listing of recalled emotive experiences are considered to be significant in the emotive event. Meanwhile, emotive experience recollected when compared with 11 emotive causes could be considered to be weak in the emotive event. If the database of analysis results is created, it may show the affinity of an emotive event and an emotive cause. The database may tell you which cause is effective for what kind of events. Or if the weak causes are built in, they could be replaced by other causes or may be reinforced by marketing.

Moreover, each case analysis result shows further possibilities of a FACEE. In the case of the emotional analysis of the Prius case, the seller encouraged empathy from a buyer by exhibiting a development episode (Bradley,2009). In addition, sellers promoted the improved fuel consumption as a marketing campaign. This is reflected in the emotional analysis result using the FACEE. The FACEE acts as a confirming tool to measure the effectiveness of the sales promotion. In the case of the emotional analysis of the Ritz Carlton case, the emotive causes of the hotel and an employee were the same. The FACEE verifies the education effect, and the impression that the brand has on consumer experience. In the case of the emotional analysis of

the movie "Titanic," the emotive causes created in the first half of the movie are contrary to those in the second half and caused a sad emotive experience. The FACEE in this case can be used to verify the effectiveness of sad story's composition.

From the case analyses, we can arrange emotive experiences and verify the effectiveness of the emotive causes using the FACEE. Therefore, we consider this emotional analysis method contributes to the field of emotive design for future products and services. Product manufacturers and sellers can design emotive experiences with respect to an emotive event using proven, effective emotive causes. Moreover, an emotional value chain analysis allows sellers to fill in the blanks of the FACEE and design new emotive experiences. A total of 11 emotive causes are included in the index for compulsive association to design concepts for products and services.

5. CONCLUSIONS

This paper proposes a framework for analyzing the causes of emotive experience, FACEE. It is a method for analyzing emotive experiences based on their emotive cause. In emotive experience research, individuals' emotive experiences have been difficult to clarify with respect to influential factors. In this study, we identified three elements and their interactions structuring an individual emotive experience and developed a framework. The elements are the subject, the object and the emotive causes. We found that the subject and the object constitute an emotive event and an individual become emotionally moved when he/she judges emotive causes. This paper provides the emotive causes of emotive experience and simplifies the analysis of an emotive event. The emotive causes are systematically extracted from personal emotive experiences. The validity of 11 emotive causes was confirmed by comparing the results of this study to the results of previous studies using large-scale data. We developed a FACEE using elements of our experiment results and a process for arranging emotive events. The emotive cause is the reason for emotive judgment of an experience by stimuli. Therefore, emotive causes are required for the structuring of an emotive experience. Systematizing emotive causes enables categorization of the emotive experience which has been considered difficult to systematize because emotive experiences could have been paraphrased and understood in various ways. The framework can enhance product and service value by facilitating the addition of emotional value in the future. An emotive experience does not require all emotive causes. In this analysis, the significance level of emotive causes is not determined although we confirmed that emotive causes comprehensively influence emotive experience. An analysis of example cases showed the validity of the framework's ability to arrange and recollect the emotive experience. Our framework contributes to the experience value research of Schmitt (Schmitt, 1999; 2010) that describes specific tools. Moreover, our methods highlight the framework's many possible functions such as a sales promotion effectiveness confirming tool, a tool to verify education effect, and a tool to measure brand impression and the effectiveness of the composition of a sad story. Moreover, the framework has the potential to add new emotive value to a product or service in the future. The analysis of a variety of cases is required for future research to evaluate the affinity of an emotive event and an emotive cause.

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Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

Environmental certification as landmark for green business: a general overview

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Submitted: May 20, 2014- Published: August, 21, 2014
DOI: 10.7350/BSR.D14.2014 – URL: http://dx.medra.org/10.7350/BSR.D14.2014

ABSTRACT

The certification of proper environmental management is regulated by a complex regulatory framework. The differences between the body (organization, process, and product) and its virtuous environmental conduct (proper management of the system, accounting impacts, and adoption of safeguard actions) are not always easily identifiable. This leads to an objective difficulty for companies wishing to pursue an environmental certification, as well as for stakeholders who are interested in understanding the actual impact of these certifications.
In order to clarify this matter, we have tried to structure an overview of the different certification schemes, making a review of the certification and on the regulatory standards that define the principles. The objective of this effort is to define a classification scheme of environmental certifications which is able, one the one hand, to support the interpretation of the complex framework described and, on the other hand, to properly choose the most suitable certification system in any different situation.
The proposed scheme can provide a useful overview of the environmental quality standards that are currently available, despite the limitations and the inevitable simplifications that characterize each classification. This type of synthesis tool can also be useful in a more general perspective as it simplifies and clarifies a fuzzy setting. It may lead policy makers towards the achievement of more strategic environmental objectives, depending on the level of production and territorial scale.

Keywords: Sustainable Development, Environmental Management System, Environmental Performance, Environmental Accounting Regulations, ISO.

1. INTRODUCTION

Sustainable development implies the integration of environmental strategies and actions with social and economic ones. Anyhow, actions towards sustainable development are often considered to have a major impact on the environmental sphere and therefore, sustainable development policies, trough environmental labelling and certification programs, can drive corporates to set environment protection as one of their priority. Environmental labels and certification schemes are usually understood as market-based instruments linking the need of environmental quality to the firm's decision-making process. These tools increase consumer's knowledge and they can also provide useful information for environmental regulators (Rothernam, 1999).
Furthermore, many firms and organizations are reticent to adopt international environmental-management systems intended to advance the sustainable development agenda. This is partly due to the fact that sustainable development is a general issue to which most companies do not know how to reply. To fulfil this gap, sustainable development should become more institutionalized in the regulations and norms. So, by decoding the general principles of sustainable development into business practices, firms should be more likely to embrace sustainable development so that it permeates all organizational activities (Bansal and Bogner, 2002).
In this context, to certify the environmental performance may enable companies to demonstrate their competence and to prove their commitment to sustainable development, thereby attaining the related competitive advantage. Environmental certifications are the answer to this need.
The environmental certification lies on the company's voluntary agreement on the integration of environmental factors, on the concept of global-quality and on a modern interpretation of competitiveness. It aims at enhancing the environmental performances of companies by stating the environmental policy commitments and their implementation modalities, by introducing and realising schemes for environmental management, by carrying out a periodical, systematic and objective audit of the effectiveness of these systems, by publishing data regarding the environmental performances, thus establishing an open dialogue between the public and the involved parties. Moreover, it has been classified as a tool that succeeded in introducing new forms and tools of governance as solid cornerstones in evolving strategy processes (Steuer et al., 2005). This tool aims at internalising environmental qualitative goals in corporate management, at changing the consumption and production attitudes.
Thus, can environmental certification correspondingly be considered as a tool to promote sustainable development? Can it be used as an indicator of the entrepreneurs' willingness to operate according to a sustainable approach?
In order to answer to these issues, being the framework that regulates the certification of proper environmental management quite complex, the first step has been to make a review of the main certification schemes, focusing on the link between sustainable development and the regulatory standards that define the principles. Then, the following stage has been to define a classification scheme of the environmental certifications analysed, which should be able to support the firms, on the one hand, in the interpretation of the complex framework described and, on the other hand, in the choice of most suitable certification system in any different situation.
Thanks to this classification scheme the main features of the various types of environmental certifications have been easily recognized and systematized and, therefore, it has been possible to make a deep discussion that lead to some overall conclusions and remarks.

2. BACKGROUND: ENVIRONMENTAL CERTIFICATIONS

Like all certifications, environmental certifications refer to some principles established at international and institutional level, defined as "regulations" or as "rules", which are used as models and become the operational guidelines for achieving compliance to a standard.
The main reference are the ISO (*International Standard Organization*) 14000 regulations and the EMAS (*Eco-Management and Audit Scheme*) certifications.
Both standards for environmental management systems are based on the *plan-do-check-act* (PDCA) method (Deming, 1986; Ridolfi *et al.*, 2008). The environmental management systems implementing the PDCA cycle, also known as the cycle of Deming, named after the consultant who proposed this approach for the steady improvement of the management of total quality (UNC, 2003), aim at a steady improvement over time (Wareham, 1994; Eklund, 1996; Gonzalez-Benito, 2005; Lozano, 2006; Casadesus *et al.*, 2008; Marazza *et al.*, 2010).
While maintaining the general inspiration of using models aiming at the continuous improvement of the firms' processes and their environmental performance, many types of standards have been developed, which make the environmental certification framework quite complex and with unclearly defined boundaries. Indeed, some certification standards concern a single product, others a whole organization. By complying to the standard rules a firm can achieve the certification of a specific environmental performance or simply the certification of the methods for evaluating its environmental impact, regardless of its entity.
In order to explain this framework, which could appear to be quite confusing, the following sections present a review of the main standards for environmental certification and an attempt for their systematic classification, based on the purpose of the analyzed standards and on the results that companies can achieve through their implementation.

2.1 The environmental certification of organizations

The first group of environmental certification standards concerns the management system of organizations, where the term "organizations" means the coordination of different units which distribute the various tasks to be carried out in order to reach a common objective.
The main standards regarding the environmental management systems of organizations are based on the reference framework established by the ISO 14000-14001 and EMAS regulations.

2.1.1 The standards of the system (ISO 14000, 14001)

ISO 14000 provides a base for the realization of an Environmental Management System (EMS).
The International Organization of Standardization defined the EMS as being part of the whole management system, including the structure of organization, the planning activities, the responsibilities, the practices, the procedures, the processes, and the resources, aimed at implementing, realizing, re-examining and maintaining an environmental policy (Abarca, 1998; Zuckerman, 2000).
An EMS includes the definition of the dimension of the management structure and it focuses on improving the environmental operations of an organization by determining the basis for a systematic approach to environmental management (Curkovic *et al.*, 2005). For the realization of this approach the standard defines five requisites: the formation of an environmental company policy and the commitment of an EMS; the development of an actuation plan; the implementation and functioning of the system; its monitoring and the possible corrective actions; management

analysis and steady improvement (Lally, 1998). Briefly, the organization must state what it intends to do, how and when it intends to do it and who is responsible for doing it. The company is then asked to set its objectives, the time span in which they will be fulfilled and establish the people involved and the adequate means required for fully achieving them.
The ISO 14001 have been defined with the aim to create a reference model which can be used at planetary level, thus a list of specifications and general requirements that the EMS must satisfy in order to be defined as such is provided. These settings are specified in a model of an environmental management system subdivided in 5 sections and composed of 17 conditions and have been drawn up taking into consideration the large variety of existing organizations and, hence, they are not to be considered specific or prescriptive (Cascio *et al.*, 1996; Gonzalez-Benito e Gonzalez-Benito, 2005).

2.1.2 The EMAS regulation

The EMAS (*Eco-Management and Audit Scheme*) regulation, which concerns the voluntary adhesion of industries to a community system of eco-management, focuses on indirect environmental aspects, meaning those impacts the various activities of an organization have or may have on the environment (European Commission, 2008). These may concern all the functions of the company, from those closely connected to the management of the products (research and development, planning, packaging, transport, use, recycling, disposal) to administrative, financial and commercial ones, as well as the relationships with contractors, subcontractors and suppliers.
The EMAS certification course requires an initial analysis in which all environmental aspects must be taken into consideration. The impacts and the level of criticality assessed for each aspect must be evaluated in order to identify where to focus actions that can improve the environmental performance.
The results of this initial recognition enable to comprehend the nature and the dimensions of the environmental problems, so that it is possible to determine eventual shortcomings at the origin and to establish objectives and priorities.
By defining the objectives, the environmental programs which incorporate the tools required for putting them into effect can be planned. For this purpose the company must have an EMS, which the EMAS standard defines as "*the part of the whole management system that includes the organizational structure, the responsibilities, the procedures, the processes and the resources in order to define and actuate environmental policies*" (www.infoemas.it).
The use of an environmental management system, which is coherent with the EMAS regulation, calls for the execution of a series of phases (www.cridea.it).
The first phase concerns the definition of the environmental policy aimed at respecting the regulations and the steady improvement of performance; it is basically a document in which the objectives and principles of action of a company are established concerning the environment, including the conformities to the pertinent dispositions on the subject.
The second phase requires an initial analysis which concerns the examination and evaluation of the environmental impact of the activities of the company and the compilation of a register listing the most important effects. This enables to consider certain aspects such as: controlled and uncontrolled emissions into the atmosphere; controlled and uncontrolled discharge into water or sewage systems; municipal solid waste or other types of waste especially dangerous waste; the contamination of the ground; the use of land, water, fuel, energy and other natural resources;

discharge of thermal energy; noise, odors, dust, vibrations and visual impact; the effect on specific sectors of the environment and ecosystems.
Conformity to the EMAS regulation results in a declaration that promotes the environmental communication of the company towards its interlocutors. This is represented by a document drawn up by the company, which is to be made public and thus composed in a concise and easily understandable manner. In order to guarantee that the data contained in the environmental declaration are reliable and that the declaration includes all the relevant issues, the EMAS regulation requires that it is examined and validated by a qualified auditor.
More specifically, the environmental declaration must describe (Buratti *et al.*, 2001): the geographical location of the site and the relative geo-hydromorphological context; the production activities carried out on the site and those connected to them; the environmental situation of the site with the quantitative data concerning significant environmental parameters; the environmental impact deriving from production activities of the site and the good practices adopted by the company with the aim of minimizing the impact; indications of the strategy to follow and how to achieve the established environmental objectives. Thanks to this approach the EMAS system has led to the development of the EMS which, besides making the companies more aware of the impact that their production activities have on the ecosystem, it has a positive effect on the organizational and management efficiency of the company as a whole (Handfield *et al.*, 2002; Emilsson e Hjelm, 2002).

2.2 **Certification of environmental accounting**

Besides the technical regulations for the definition of the EMS of the organizations, which were the object of the previous paragraph, some criteria for the certification of the methods concerning the accounting and evaluation of the measurement of environmental impact have been defined, as well as their ways of communication.
These criteria are presented in this paragraph, starting from a review of the regulations concerning environmental accounting (ISO 14040-44, ISO 14064 and ISO 14067) and their declaration and communication (ISO 14021-24-25).

2.2.1 The Technical Regulation Framework

2.2.1.a Life Cycle Assessment (ISO 14040,14044)

Among the various approaches which are being established at international level for measuring the impact of production activities on the environment, one of the most widespread is the *Life Cycle Assessment* (LCA) method, which over the last 20 years has been progressively adapted to be applied in the analysis of products and production chains (Harris e Narayanaswamy, 2009).
The LCA method was introduced to quantify the environmental impact relative to the production and consumption of products deriving from industrial processes (Curran, 1996; Audsley *et al.*, 1997). It systematically evaluates the whole life cycle of a product, from the purchase of the raw materials, throughout the production phase, up to its final disposal. In the classic version of the analysis, it incorporates into the calculation the emissions and the impact of the raw materials used and all the post-production processes (distribution, sale, use, recycling); for this reason it is usual to affirm that the LCA assesses the impact of a product "from cradle to grave".
The method is formalized in the ISO 14040 and ISO 14044 standards, which supply the necessary references to define an operative tool for quantifying the environmental impact of the

production systems (Earles e Halog, 2011). More specifically, the ISO 14040 regulation defines the reference framework for evaluating the life cycle (LCA), while the ISO 14044 regulation represents the overall technical revision of the basis of the LCA and it specifies the requirements and guidelines. It is important to note that the ISO 14040 states only the principles for evaluating life cycles, without specifying the methods to use in each specific phase of the LCA; these principles especially concern:

a) the definition of the objective and the field of application;

b) the phase of the inventory;

c) the phase of evaluation of impact;

d) the phase of interpretation;

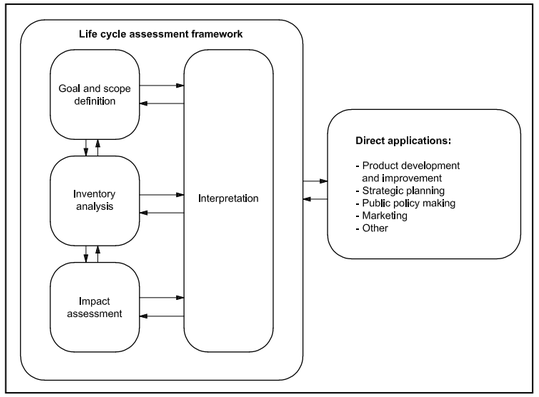
e) the report and critical revision;

f) the limitations;

g) the correlations between the phases;

h) the conditions for the use of optional values and elements.

Figure1. Reference framework and applications of LCA



Source: ISO 14040:2006 Second Edition

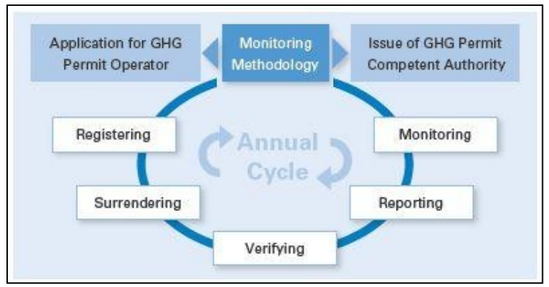
A key point of the LCA concerns the fact that the standards of reference do not limit the functional unity which is the object of the evaluation; for this reason the spatial detail and the time reference of an LCA analysis can vary in relation to the objective and the field of application. Since there are various ways to calculate the LCA, the results of the evaluations may be compared because although they are focused on the same product, they refer to different time and spatial limits of its life cycle. This situation comes from the fact that the various clients may be interested in observing the impacts of the same product in a different way, as they intend to emphasize some characteristics rather than others.

The LCA method foresees the inclusion of new scientific knowledge, the improvement of the technical state of art and the divulgation of the results. In order to favor the diffusion process of the method, a database has been developed containing the reference data for the various categories of impact to be used as models for estimating LCA.

2.2.1.b GHG accounting (ISO 14064)

The objective of the ISO 14064 is to define a standard for the accounting of *Green House Gasses* (GHG) which, by means of the specification of various clear and verifiable requirements, can help the organizations to plan, develop, manage and monitor the systems for the evaluation and reduction of Green House Gas emissions.

Figure 2. Plan of the ISO 14064 approach



Source: Reed, 2007

The ISO 14064 regulation, which is shown in figure 2, is formed in three parts (Reed, 2007):

- Part 1: "*GHG specification with guidance at the organization level for the quantification and reporting of greenhouse gas emissions and removals*", which specifies the verifiable requirements of the organizations for planning and carrying out GHG inventories and for participating at the voluntary or involuntary registration of projects, programs or schemes aimed at reducing GHG.
- Part 2: "*Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*", which specifies the verifiable requirements in the planning, control, measurement and reporting of the projects, including the reduction of green house gas emissions; these requirements are useful for the organizations which participate in allowance programs and schemes for limiting GHG.
- Part 3: "*Specification with guidance for the validation and verification of greenhouse gas assertions*", which specifies the verifiable requirements of the control certifiers concerning statements regarding GHG related to organizations (part 1) or projects (part 2).

The ISO 14064 regulation was followed by ISO 14065:2007, which was developed with the aim of defining the requirements for the organizations that are responsible for the certification and verification of the schemes used by the companies to evaluate and reduce their GHG emissions.

2.2.1.c Carbon Footprint of product (ISO 14067)

The ISO 14067 regulation is aimed at defining the criteria for evaluating the so-called *Carbon Footprint* (CF) of a product, which quantifies the whole amount of CO_2 and other green house gases (CH_4, N_2O, HFC) associated to goods or services during their life cycles.
The CF is based on an evaluation which uses the same approach as the *Life Cycle Assessment* but, in contrast with this, it only takes into consideration emissions that have a direct effect in terms of global warming and that are calculated using *Global Warming Potential* (GWP100) indicators defined by the IPCC (*Intergovernmental Panel on Climate Change*).
Up to now there have only been two common approaches regarding the calculation of the emissions produced. The first approach contemplates the calculation of all the emissions produced within a life cycle (supply chain, use, end of life). The second approach foresees the insertion of the time dimension within the LCA analysis and to deal with the emissions in different ways according to the moment in which they take place. This leads to value emissions produced in the past in a different way compared to those produced during the life cycle, bearing three aspects in mind (www.europeanoutdoorsustainability.org):

a) to carry out an LCA of perspective (with or without time limits);
b) to value the chosen perspective (with or without priorities of immediate reduction of the emissions);
c) incentives of virtuous behavior in the calculation stage.

2.2.1.c Eco-labeling Scheme (ISO 14021, 14024, 14025)

Following the adoption of one of the standards described in the previous paragraphs, the organizations can use specific labels, produce environmental declarations or characterize their products through labeling (Fet, 2006). The communication of environmental performance is regulated by specific regulations, which lie within the ISO 14000 series and determine various types of "environmental labels".
The definition of regulations for controlling environmental declarations is a response to the growing need to solve the problems caused by the so-called "green wash", a superficial and at times misleading approach of the companies concerning environmental responsibility, which is communicated, rather than actually practiced by the companies, with the only purpose of improving its visibility and reputation on the market (DG Ambiente *et al.*, 2000).
In order to transmit correct environmental information various schemes of *Ecolabelling* were defined (Magerholm *et al.*, 2009) and a synthetic framework of this scheme is reported in figure 3.

- Type I (ISO 14024): these labels concern the impact of the products' life cycle and their use is subjected to and limited by verification carried out by third parties; indeed, it is the certification body that establishes the requirements to be fulfilled so that the organization has the right to use the label. A few of these labels, such as the *CE Eco-label*, *Nordic Swan* and the German label *Blue Angel*, can be used by both state and private companies.
- Type II (ISO 14021): the labels that are inspired by this standard concern the auto-declarations of manufacturers and wholesalers who do not require any type of verification by external parties. This type of environmental communication includes various voices, among

which for example: “made from recycled materials” or “100% vegetable material”.

– Type III (ISO 14025): this category includes the forms of environmental communication that supply information on the impact of the life cycle of a product. The quantification and declaration of this impact must be presented so that it is possible to make comparisons, between products concerning various parameters. For this purpose, the regulation foresees that the evaluation must be carried out using the LCA criteria (in compliance with ISO 14040 and 14044), which will be evacuate by third parties and will give as output a specific document called the *Environmental Product Declaration* (EPD), which will be described later.

Figure 3. The types and characteristics of environmental labels according to ISO regulations

ISO Environmental Claim Types *(1) (2) (3)*

Type I ISO 14024	**Type II ISO 14021**	**Type III ISO/TR 14025**
KEY FEATURES		
□ pass/fail award system □ third party grants licence to use label (typically a logo) □ voluntary	□ text statement and/or logo □ improvements should be quantified □ voluntary □ avoid meaningless statements eg ‘environmentally friendly’, ‘sustainable’	□ quantified information □ may be presented in variety of forms eg text, graphs, pictorals
□ multi-issue, based on product’s life cycle impacts	□ generally single issue but may be multi-issue; must be significant according to ISO standard	□ multi-issue, based on Life Cycle study
□ criteria set and product assessed by third party	□ self-declared, no third party involvement	□ self-declared but must be peer reviewed according to ISO technical report

Source: DG Environment, European Commission, Allison e Carter (2000).

2.2.2 The Environmental Accounting Certification of an organization

The Environmental Accounting Certification of an organization is a complex and sometimes confusing matter; indeed, there is often a tendency to identify the evaluation of a company environmental impact with that of its products. This association, besides being incorrect from a theoretical point of view, also has operational limits, since the impact of the products only represents a part of the whole organization. In fact, there are other aspects of the production

structure such as administrative, commercial and logistic functions, which are not directly involved in the life cycle of the products, but have an environmental impact
In order to evaluate the environmental load produced by an organization it is necessary to obtain tools that take account of the totality of the impacts caused by its activities as a whole. However this approach, if applied at territorial scale, enables to evaluate the environmental impact of all the processes that develop within a delimited area as well. From this point of view there are interesting perspectives since the territorial certification sector has not yet been fully developed and thus there are many opportunities for single primary sector companies, industrial and agricultural and food production districts (Franco e Pancino, 2008), and for whole communities as well.
An innovative method promoted by ADEME, the French Environmental and Energy Management agency, is included in this framework. ADEME developed a diagnostic environmental tool called *Bilan Carbone*. This is a method for quantifying the emission of greenhouse gases which is applicable to any type of organization: industry or tertiary company, public administration, community or territory. With the *Bilan Carbone* it is possible to carry out an evaluation of the GHG emissions produced by all the physical processes that can be circumscribed within a human organization or, when possible, within clearly identifiable boundaries. At the same time, the method evaluates the economic vulnerability of the people involved in the system which is the object of analysis (ADEME, 2007).
The *Bilan Carbone* defines a calculation method which is compatible with ISO 14064 and with the 2003/87/CE directives concerning the trading of CO_2 Emission Reduction Units (ERU). By applying this method it is possible to evaluate the direct and indirect emissions of the unit which is the object of analysis, thus identifying the nature and determining an order of the priorities of the actions for reducing the emissions relative to the various processes that cause them (www.ghgaccountingsoftware.com).

2.2.3 Certification of environmental accounting of a product

With the aim of reducing the impact caused by human activities on ecosystems and natural resources, in February 2001 the European Commission published the Green Book on the integrated policy of products (European Commission, 2001), in which the role of environmental labels and environmental declarations of products are established (Zackrisson *et al.*, 2008).
An ecological quality label of a product is proof of environmental sensitivity, which is visible to the final consumer who is becoming more and more aware of environmental issues. These labels often appear as labels attached to products but they can also assume the form of publicity or declaration at the moment of sale. Whatever way they are communicated to the consumer, these labels are intended to provide information on the actions that the company has carried out to reduce environmental impact, with the aim of improving its reputation and obtaining a *premium price* for its products (Bruce e Laroiya, 2007; Bleda e Valente, 2009).
For this reason various models have been defined which enable companies to certify the environmental performance of the products establishing criteria for the evaluation of the impact and for the communication of the relative results; in this paragraph the principles, characteristics and field of application will be described.

2.2.3.a Publicly Available Specification (PAS) 2050

The PAS 2050:2008 scheme establishes the requirements for evaluating the GHG emissions of

the life cycle of products – goods and services – and describes the guidelines for evaluating each category of impact on global warming; the aim is to put a simplified and standardized implementation at the companies' disposal concerning the application of the LCA method (and therefore of the ISO 14040 and 14044 regulations) in the calculation of GHG emissions.
The aim of the PAS 2050 scheme is to promote a complete understanding of GHG emissions deriving from production processes, thus providing a common base for the comparison and communication of the results. In this respect, the PAS 2050 regulation does not impose any obligation to disclose the data elaborated by the model concerning GHG emissions; however, whenever a company using the scheme decides to communicate the results of evaluation carried out by the stakeholders – including the consumers – the regulation indicates the information which must be disclosed.
It is important to note that the PAS 2050 regulation can also be applied to organizations; in this case the reference is represented by the ISO 14064 regulation, therefore by an approach that takes into consideration the evaluation of the emissions of all the production processes – in compliance with the ISO 14040 – and therefore sum up the results. In this case the regulation defines the requirements necessary to identify the boundaries of the system used as a reference, the sources of GHG emissions associated with the products within the system, the necessary data for carrying out the analysis and the method for calculating the results.
The organizations that declare to be in compliance with the PAS 2050 regulation, not only have to guarantee that the evaluation of GHG emissions of the life cycle of a product is complete, but they must also be able to demonstrate which principles were taken into consideration at the time of the evaluation (www.bsigroup.com). Thanks to this opportunity, a growing number of companies are calculating the emissions produced and identifying the possibility of reducing them by using the PAS 2050 (Espinoza-Orias et al., 2011).

2.2.3.b Environmental Product Declaration (EPD)

The EPD declaration is an instrument that provides an indication of the environmental impact of goods and services by communicating some specific parameters. It is based on a life cycle analysis according to the ISO 14040 regulations and follows communication modalities in compliance with ISO 14025. It follows that this scheme evaluates the impact of a product from the extraction and elaboration of the raw materials throughout the manufacturing process, packaging and delivery, use, recycling and maintenance up to the end of its useful life span (Klöpffer, 2005; Zackrisson *et al.*, 2008) and that these impacts are communicated by means of Type III environmental labeling (Grahl e Schmincke, 2007).
The EPD system is a standard, with a registered label (www.environdec.com), which over the last ten years has acquired great importance in various countries such as Finland, Italy, Japan, Norway, Poland and Sweden (Steen *et al.*, 2008). There are different EPDs which have been registered by the sovereign States for the environmental certification of a product, some of which are listed in table 1.
The most renowned is the EPD registered in Sweden, the forefather of the family, which has taken the same name of the reference (Row e Wieler, 2003). Indeed, EPD is an acronym of this (and of other) specific environmental certifications of a product that is also the general name for identifying this family of certifications. Other similar declarations are the Japanese *EcoLeaf* by JEMAI (*Japan Environmental Management Association for Industry)*, the Korean *Environmental Declaration of Product* by KELA (*Korea Environmental Labeling Association*) and the

Norwegian *NHO Type III programme*.
The environmental declarations of a product contain three parts:

- the description of the product, as they are unities that refer to calculations;
- the environmental performance of the product, in relation to its life cycle and in particular to the estimation of the effects and influence on the various categories of environmental impact for example the potential of global warming (GWP);
- information concerning the accredited certification body.

Table 1. Some of the national EPD standards

Name	Area	Source	Logo
The International EPD scheme	Sweden	www.environdec.com	
JEMAI EcoLeaf Type III declaration programme	Japan	www.jemai.or.jp	
KELA EPD programme	South Korea	www.koeco.or.kr	
NHO Type III programme	Norway	www.epd-norge.no	

2.2.3.c Protocol Initiative GHG Accounting

In the field of environmental certification there are a number of private initiatives, which more and more often, during the phase of study and development, are approved by academics, scientists and by entrepreneurs. Being approved by these bodies gives to these certifications acknowledgement and visibility, which consolidated them at international level. Among these, there is the GHG protocol, which establishes the requirements and guidelines for quantifying the emissions associated with a specific product; this standard is addressed to companies that intend to analyze in more detail the GHG flows deriving from production and then communicate the positive results of this evaluation in order to gain competitive advantage.
This new standard provides a standardized method for making inventories of the emissions associated with single products throughout their life cycles, bearing in mind the possible supply chains and impacts situated upstream and downstream the company operations. On account of this broad spectrum of application, various declinations of the protocol were defined according to the object of interest:

- corporate accounting and reporting standards;
- project accounting protocol and guidelines;
- corporate value chain accounting and reporting standard;
- product life cycle accounting and reporting standard.

Starting from the evaluation of the impact of the product, these declinations can cover various scales, from the production chain to the company as a whole. The main aim of these standards is to provide a complete approach that starts by evaluating the product and then considers the

network of interactions that the manufacturer interweaves; thus, a protocol of actions to follow with the aim of reducing the emissions is identified (Green House Gas Protocol, 2011).

2.2.3.d Ecolabel

Ecolabel is a voluntary system that encourages manufacturers to commercialize goods and services characterized by a positive environmental value. Its strength is the ease of identification by consumers; indeed, it is a European label of ecological quality which identifies environmentally-friendly products and characterizes them for their reduced impact in relation to competitors throughout their whole life cycle (www.isprambiente.gov.it). According to the classification illustrated in figure 3, *Ecolabel* belongs to the Type 1 environmental labeling group (Baldo *et al*., 2009).
The system of the *Ecolabel* label is part of the EU policy concerning consumption and sustainable production whose objective is to reduce the negative production and consumption impacts on health, climate, natural resources and the environment.
The criteria for issuing the label are not based on a single factor but on the analysis of the impact of the product throughout its life cycle, starting from the extraction of raw materials in the pre-production phase, through its production, distribution and disposal. The validation of environmental performance is established by means of documentation which proves the company's effort and commitment for reducing the environmental load relative to the management of the product by limiting atmospheric, water and soil pollution, managing and differentiating refuse effectively, reducing the amount of energy and resources wasted and safeguarding biodiversities.
The choice of products with the *Ecolabel* label is based on the level of diffusion of the product on the European market, which must be to the extent to lead to substantial environmental improvement through the choice of the consumers, concerning the technical and economical feasibility of the necessary adaptations of the company in order to adhere to the system within reasonable time limits (Ispra, 2010).
The EU *Ecolabel* label covers a large range of goods (household electrical appliances, lubricants, paper products, textiles, household goods, cleaning and garden products and services such as tourist accommodation) and it is rapidly increasing as many manufacturers have become aware of the potential competitive advantages of this certification which is recognized all over the European Union and in the SEE (Norway, Iceland and Liechtenstein) and, thus, have invested in this label.

3. RESULTS AND DISCUSSION

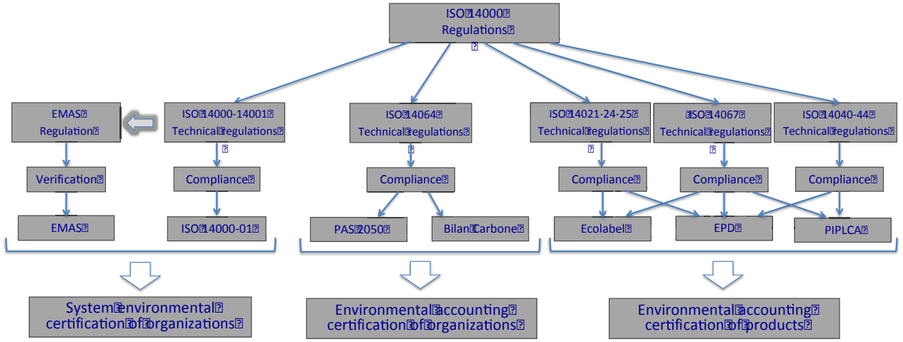
The certification of proper environmental management is regulated by a complex framework of regulations. The differences between entities (organisation, process, product) and virtuous environmental behaviour (correct system management, impacts accounting, safeguarding actions), which are the object of the certification, are not always easily identifiable. This leads to a difficult interpretation both for companies wishing to pursue an environmental certification, and for stakeholders who are interested in understanding the actual impact of these certifications.
In order to comprehend this articulated subject, a series of different schemes of certification have been defined. Then, they all have been classified, on the base of the object of the certification and on the regulations that define the standards. Through a systematic approach taking into account

the main elements emerged from the review, a classification scheme has been set. This scheme should be able to support the interpretation of this complex framework, and therefore enables firms to choose the most suitable certification system.
In other words, our attempt has been to define some clusters on the base of the object of each certification and then design a map of systematic links between the standards. .The proposed scheme is reported in figure 4.
All the regulations that define the environmental certifications belong to the ISO 14000 family but, coherently with the approach adopted and as already mentioned, it is possible to distinguish them in relation to the object of certification.
This approach outlines three distinct types of certification:

1. System environmental certification of organizations;
2. Environmental accounting certification of organizations;
3. Environmental accounting certification of products.

The ISO 14000-14001 and EMAS regulations are included in the first category, which are the main standards concerning the Environmental Management Systems of organizations. EMAS certification whose definition comes from the technical ISO 14000-14001 regulations, requires not only compliance with the technical references, but also the verification of what is imposed by regulation.
The other two categories include all the technical regulations that refer to the environmental accounting concerning both the organizations and each individual product.
The ISO 14064 falls into the category called "Environmental Accounting Certification of Organizations". The *Bilan Carbone* method uses the ISO 14064 for accounting the GHG emissions.
The standards defined by the *Ecolabeling Scheme* (ISO 14021-24-25), *Carbon Footprint of product* (ISO 14067) and *Life Cycle Assessment* (ISO 14040-44) regulations belong to the "Environmental Accounting Certification of Products" category. The product certifications obtainable from these groups of technical regulations are essentially three: *Ecolabel*, *Environmental Product Declaration* and *Protocol Initiative GHG accounting*. As shown in the table, the first is obtained when the company is in compliance with ISO 14021-24-25 or ISO 14067, the second can be obtained by complying with all three types of ISO regulations mentioned while the last is obtained when compliant with ISO 14067.
An emblematic case is the PAS 2050 certification which uses two different standards for its definition according to the object of its use: the emissions accounting of a product or the accounting of the organization emissions , intended as the emissions of all its products. In this latter case the certification is based on the creation of a database concerning the emissions of each single product according to the specifications laid down by ISO 14064, in compliance with the accounting to the whole organization.
Despite the limits and the simplifications that characterize every classification, the proposed scheme represents a useful framework of the system of environmental quality standards currently available. The possible ways of communicating their use to the stakeholders and the subsequent effects on sustainable development practices should also be taken into consideration.

Figure 4. Systematic classification of the various types of environmental certifications



Source: Authors' elaboration.

In terms of sustainable development the firms should demonstrate their competence and prove their commitment to sustainable development, but if not all the possibilities are known environmental certification could become a limit instead of being a competitive advantage.
Therefore the scheme of classification proposed can become a useful support for whoever is asked to choose between various schemes of Environmental Quality Certification, defining an accounting systems to be applied at different levels. Even more so for those companies that, in a complex regulation framework, are asked to choose between the various instruments used for environmental evaluation. Thus, the single norms and regulations have been analyzed using a classification scheme and pointing out all their features in terms benefits they can generate for the company, as well as for the community.
For instance, within the group of environmental certifications related to the organizations' system, it is widely recognized that the ISO 14000 standard does not establish specific environmental operations to be followed; it defines a system that helps companies to reach their own objectives by means of a proactive approach towards the management of environmental issues and their total integration with the management of the company (Tibor and Feldman, 1996; Lally, 1998). On the contrary, the EMS that follow the ISO 14001 standard provide a list of specifications and general requirements that must be satisfied in order to be defined as such and therefore it diffusion is greater. The reasons behind the diffusion of this environmental management system can be found in the two main advantages which characterize this certification process. The first is linked to the direct benefits of an effective EMS: a clear definition of the hierarchy and responsibilities, identification of the environmental objectives, reduction of management costs, continual updating (Begley, 1996; Abarca, 1998; Dale, 2002; MacDonald, 2005). The second concerns the possibility of replying effectively to the external pressure of the stakeholders and take advantage of new commercial opportunities through appropriate environmental marketing operations (Llomaki e Melanen, 2001; Ghisellini e Thurston, 2005).
However, it should be underlined that compliance with the ISO 14001 standard assures us that the company has implemented an environmental management system, but it does not guarantee

its functionality (Curkovic *et al.*, 2005); in fact adhering to this type of certification does not automatically improve environmental efficiency or a reduction of environmental impact. On the contrary it only guarantees the compliance with an organization standard (Scott, 1999; Clark, 1999). Therefore it is not surprising that the most widespread criticism of the ISO 14001 standard is the mediocre relationship between the use of this standard and the improvement of the environmental performance of the company (Mroz, 1997; Montabon *et al.*, 2000).
This criticism appears to be shared since the regulation does not call for any analysis of the causes which combine to bring about the environmental impact of the production operations but it essentially focuses on the interaction of the production process with the external environment proposing large-scale solutions and privileging an organizational approach rather than a technical approach. Moreover, without doubt a critical point is that it does not define clear methods for evaluating impact (Bishop, 2000; Burdick, 2001).
Moreover, the ISO 14001 defines a management standard and not a performance standard. Therefore the effort made by the organization is aimed at the continual improvement of the EMS and not at environmental performance. This means that the organization can successfully implement ISO 14001 standard without greatly reducing its environmental impact (Ghisellini e Thurston, 2005).
The EMAS certification is based to the desire to achieve an improvement in the companies concerning environmental quality according to criteria and deadlines which depend more on the social and competitive pressure perceived by the company than form cogent regulations. Indeed, the EMAS system belongs to the so-called "soft tools", which is based on a voluntary approach, on negotiation and the shared responsibility of the people involved (Iraldo *et al.*, 2009).
In order to adhere to EMAS the only necessary pre-requisites are to respect the pertinent environmental regulations and the company's commitment to search for the continual improvement of its environmental performance (Buratti *et al.*, 2001). From this point of view the EMAS process is similar to ISO 14001: the company must adopt its own environmental policy and establish the modalities with which to pursue constant improvement. As in the case of ISO 14001, the third party control role of the management system is essential in order to guarantee an external and independent supervision that helps the organization to reach its environmental goals.
Analyzing the environmental accounting certifications, it can be made a first differentiation between certifications of products and certifications of organizations. Within the first category, the principal tools that have been analyzed are the LCA, the EPD and the Ecolabel.
The LCA method has many advantages. It can help to identify the opportunities for improving the environmental performance of the products in the various phases of their life cycle; they inform the decision makers in industrial organizations concerning strategic planning, defining priorities, the planning and re-planning of production processes; select indicators and measuring techniques of environmental performance; favor commercialization by implementing an ecological labeling system or an environmental declaration of the product. The strong point of the application of the LCA standard is its definition and the attention paid to the life cycle of a product. However, the advantage of being able to evaluate the environmental impact of a product by defining the limits of the analysis in function of the clients' requirements consequently leads to the problem of making the comparison of the results obtained rather complex (Zhang *et al.*, 1999).
As it concern the EPD, even if the subjects of these declarations, such as the final consumers, are distinguished stakeholders, they are not necessarily aware of environmental issues; the present profile of this type of certification is not used as much as expected as it appears to be quite

difficult to understand the quantitative evaluations reported in the environmental declaration of the product (Steen, 2008).
On the other hand, unlike most of the environmental labels, Ecolabel has a multidimensional nature that is mainly focused on CO_2 emissions while taking into consideration various environmental aspects based on other requirements, thus providing a wider vision of environmental issues. The aim is to assure that these labels supply environmental information concerning the objective and quantifiable impact of the products even if all the limits of the LCA regarding the subjectivity of the time and spatial limits of evaluation still remain. This means that a true comparison between products with similar functions can only come about if the same criteria for defining the limits of the life cycle have been established. It should also be noted that unlike the Type I labels, there is no minimum environmental performance that the organization must comply with in order to adopt this form of environmental declaration of a product.
The use of these standardized approaches for accounting and monitoring GHG emissions should assure a higher level of homogeneity into the data produced at planetary level; this would help to reduce our doubts concerning the declaration of emissions and encourage the various protagonists – governments, market operators, and the interested parties to have faith in the results presented and the declarations that accompany them.
The success that these initiatives of standardization are having in the business world is due to its ability of outlining the fragile defining boundaries among the various scales of analysis and localizing the object in the clearest possible way.
The last group of certification that the classification scheme proposes encloses only one ISO regulation, which is the 14064. Within this regulation two methods have been analyzed: the PAS 2050 and the *Bilan Carbone*.
The PAS 2050 standard calculates the carbon footprint of goods and services produced by businesses, helping them to reduce their emissions, while improving their company reputation and identifying savings opportunities. Furthermore, it provides a benchmark for on going programmes aimed at reducing GHG emissions and allows for a comparison of goods or services using a common, recognized and standardized approach to life cycle GHG emissions assessment. These benefits will be invaluable as we move to a green economy where greater appreciation of our environmental impact will be essential for sustained long-term growth.
The *Bilan Carbone,* besides being acknowledged by its users as an instrument for favoring the reduction of GHG emissions, represents a useful support for environmental decisions when it is necessary to take into account economic limitations. Therefore the method proves to be particularly useful in all those situations in which it is necessary to integrate the evaluation of the effects of actions aimed at reducing GHG emissions with the economic impact they may have on the activity of the organization or of the territory. In short, when underlining the peculiar characteristics of the *Bilan Carbone* method compared to other environmental evaluation techniques, such as the LCA or PAS 2050, there are three fundamental aspects. The first aspect concerns the GHG whose emissions are evaluated and on the contrary to what usually occurs, they are not limited to those mentioned in the Kyoto protocol but as a whole, such as the CFC and the stratospheric vapor of airplanes. The second aspect is represented by the explicit consideration of indirect emissions that other methods do not consider or include. The third aspect, probably the most innovative, is the aim of the method which does not only consider the comparability of the results, but its main purpose is to provide the decision maker, whoever he/she may be, with the right tools for limiting the emissions of a territory thus reducing the environmental impact of all the production activities which take place on it (www2.ademe.fr).

Business Systems Review, ISSN: 2280-3866 , Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the 2nd B.S. Lab International Symposium

4. CONCLUSIONS

Over the last few years the heated debate on environmental issues, the catastrophic consequences of natural disasters and the increase of extreme climatic phenomena have called for economic decisions that use environmental sustainability as a guideline. Companies are expected, just as well as policy makers, to evaluate this issue and coherently find solutions. They are also requested to carefully monitor the relationship between production and its impact on the ecosystems and to look for an efficient equilibrium between competitive and environmental performance.
Indeed, it is well-known that the consequences of the production process have gone well beyond the physical limits of industrial sites and that the life cycle of the products represents a potential source of environmental impact to be evaluated and controlled. This has led to a growing environmental awareness by many stakeholders resulting, on the one hand, in a tangible development of the regulatory framework and, on the other hand, in a stronger will of entrepreneurs to include environmental issues in their competitive strategies.
Therefore, some companies have aimed at improving their environmental performance, not only during the production process but also in the management of relationships with their suppliers and clients giving rise to the Environmental Management System of the supply chain.
Meanwhile, the consumers, through their associations and environmental movements, have put pressure on the legislators to obtain a better regulation concerning the environmental impact of production.
As a consequence there was a proliferation of regulatory measures, mainly based on command and control strategies, which obliged firms to provide environmental information on their products.
Some authors believe that these measures proved to be inefficient in safeguarding the environment due to a minor definition of the concept of sustainability, arguing that they also made the relationships between firms and their stakeholders more complex. Conversely, others think that the regulations had a positive effect since they pushed companies to take better decisions concerning environmental issues. However, it is undeniable that firms often view the application of production standards as an obligation to comply with; they are subject to complex and often ambiguous mechanisms concerning, above all, the connection between the certification procedure and the possible results.
Certifications are a tools, their objectives lead an eco approach. They are often linked to an environmental performance but without any comparison parameter. They aims to environmental issue management and they provide only a result. What is behind these schemes is the environmental saving willingness but is not clear the way they reach the point.
The certifications help the firms into the regulation process that lead to a critic approach to the environmental issues and they address the production to a more tested and clear production chain. They show the limits and the criticisms and provide a firm's wide engaged effort. So this tool could accompanies and promotes the sustainable development, but in such a complex situation, an instrument of synthesis of the kind proposed in this study could be advantageous in a more general perspective as, by simplifying and clarifying a rather cloudy panorama, it could become a sort of compass for getting one's bearings concerning the policy maker's decisions in order to achieve environmental and, widely speaking, sustainable development objectives. It results how some of the regulations provide better hints and thus are able to attest the entrepreneur's willingness of operating in a critical manner and contributing to sustainable development.

Furthermore, through these instruments consumers feel more confident towards the exactness of labels content.
The diffusion of these tools could be red as an increasing of consumer's environmental pressure on production system or a competitive advantage of firms into the environmental management issues. They are voluntary, so the willingness of the entrepreneurs is shown. The chosen though them towards sustainable approach should be driven buy institutions.
Thus, environmental certification can surely be contemplated as one of the tool that can contribute to the sustainable agenda that policy makers intend to promote. Indeed, labels and certificates help companies provide a voluntary mechanism through which they can credibly demonstrate their environmental responsibility.

ACKNOWLEDGEMENTS

Although the paper is the result of the shared work of the authors, their specific contribution can be attributed as follows: Nicolò Passeri wrote paragraphs 2 and 3; Barbara Pancino wrote paragraphs 1 and 3; Silvio Franco wrote paragraph 4.

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Business Systems Review

ISSN: 2280-3866
Volume 3 – Issue 2, 2014
Special Issue - Selected papers of the
2nd B.S.Lab International Symposium

How to become a benchmark sustainable tourist destination? A descriptive model.

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Submitted: April 30, 2014- Published: August, 21, 2014
DOI: 10.7350/BSR.D15.2014 – URL: http://dx.medra.org/10.7350/BSR.D15.2014

ABSTRACT

According to literature the future competitiveness of destinations will be based on their ability to be sustainable in time in terms of economic, natural and cultural resources. For these reasons, managers often try to establish strategies and operational procedures that lead to the achievement of sustainable competitive advantage of tourist destinations, including also benchmarking techniques. Several indices and processes of sustainability and competitiveness are identified in the economic and managerial literature and can act as guidelines for local actors and managers in strategic planning for the sustainable development of a tourist destination. Despite this, there have been limited applications of benchmarking in tourist destinations. This paper aims at identifying the set of features of worldwide benchmark destinations of sustainable tourism in order to propose an illustrative framework to be followed by destinations which choose the path of sustainability, through a systematic analysis of related literature and the analysis of worldwide tourist destinations awarded with the most important prizes for sustainability. This results in the creation of a set of best practices for tourist destinations thus providing an important contribution to the literature on this topic. However, it shows important limits: it only considers the sustainable destinations awarded in the last 5 years, it doesn't supply a distinction between different types of destinations and, finally, it employs the award assigned to different tourist destinations as unique parameter of benchmark of sustainability. In the future we will focus on particular types of tourist destination, awarded or not, thus identifying development strategies.

Keywords*:* Tourist Destination, Benchmark, Sustainable Destination, Tourist Strategies.

1. INTRODUCTION

Tourism is one of the fastest growing sectors in the twenty-first century (Wto, 2007). It is an important driver of development (Weaver, 2006; Scheyvens & Momsen, 2008) because it enhances economic growth and encourages local development, increasing employment and national income (Szivaz et al., 2003; Torres & Momsen, 2004; Na Sakalnakorn & Naipinit, 2011).
The tourism allows, therefore, a set of opportunities but, if badly managed, it can also lead a series of dangerous (Mowforth & Munt, 2008; McCool et al., 2001). In this context, the "Sustainable Tourism" has an important role for correct development and competitiveness of country. It is defined as a «*tourism which is in a form which can maintain its viability in an area for an indefinite period of time*» (Butler, 1993), enhancing opportunities, restricting damages and improving the competitiveness of tourist destinations.
The combination of competitiveness-sustainability is particularly emphasized in the context of tourist destinations and the theme of the competitiveness of a sustainable tourism destination has assumed, therefore, a major role in the international literature of recent decades (Franch et al., 2010; Hong 2009; Enright & Newton, 2005; Ritchie & Crouch, 2003; Hassan 2000; Pearce 1997).
Therefore, managers and policy makers must try to establish strategies and operational procedures that lead to the achievement of sustainable competitive advantage of tourist destinations, including also benchmarking techniques (Kozak & Rimmington, 1999).
Understanding the meanings of sustainability, then, suggests a focus on identifying what tourism should sustain (McCool et al., 2001). Following this discussion, indicators of sustainability need to be selected and monitored (WTO, 1996; WTO, 2004; OECD, 2010; Jurdana & Frleta, 2011).
Several indicators of sustainability and competitiveness, identified in the economic literature, are contained in the guidelines of the ecolabels or prizes of sustainability.
Thus the criteria used to obtain the certificates and/or ecolabels can become successfully guidelines for local actors and managers in strategic planning for sustainable development of a tourist destination. Benchmarking with other tourist destinations would allow, with a systemic point of view, the creation of a virtuous cycle for the long-term development.
The aim of this study is to identify a set of features that a tourist destination has to possess or develop in order to follow the path of sustainability.
To reach the goal, we decided to organize the paper in two parts. The first part propones a survey of the most recent contributions on:

- pro and con of tourism development in country and the importance of sustainable tourism;
- the importance of competitiveness of tourist destinations and the implications of sustainable tourism;
- the importance of monitoring indicator of sustainable tourism for the strategic decisions and planning of sustainable development of tourist destination;
- the role of criteria of prizes of sustainability as a sustainable indicators for benchmarking model for sustainable tourist destinations.

In the second part, the results of an analysis conducted on a sample of 81 European tourists destinations, awarded with the most important prizes for sustainability in the last 5-years, are presented and commented on, highlighting the different characteristics of the several factors

affecting destination sustainability, classified in five macro-areas: environmental management, eco-tourism/natural assets, supporting assets, cleaner production and tourism carrying capacity.
In the end, we will suggest strategies are also based on the results of the benchmarking model to improve the competitiveness and sustainability of tourist destinations.

2. THEORETICAL BACKGROUND

2.1 The two different sides of tourism for growth of Countries

Tourism is one of the fastest growing sectors in the twenty-first century (Wto, 2007). While the growth is significant in developed countries, international tourism growth also in the developing nations is even more impressive and not always with good results.
Tourism is an important driver of development (Weaver, 2006; Scheyvens & Monsen, 2008) because it enhances economic growth and encourages local development, increasing employment and national income (Szivaz et al., 2003). More specifically, the tourism: raises the revenue - direct and indirect revenues realized through the subsequent dynamic of the multiplier effect as other local economic sectors (Weaver, 2006) -, increases the employment - wherein the labor intensive tourism industry would provide a large number of direct and indirect jobs (Weaver, 2006) -, raises local incomes, improves economic local structures, stimulates the production of local goods that are related with tourism, allows the social development (Torres & Momsen, 2004; Na Sakalnakorn & Naipinit, 2011).
If this is evident in developed countries, tourism becomes more economically important for developing countries. In fact, for these, tourism represents a set of opportunities: to control their own contact with the outside world, economic opportunities, to promote a general understanding of a sensitivity towards their life, culture, society and belief systems.
The opportunities carried by tourism may become the double-edged sword if not properly managed. However, it can also represent a series of dangerous: of subversion of lifestyle and culture due to the corrupting effect of money, of corrosion of lifestyle as a new way, practices and fashions are introduced without due care and forethought, of exposure to desease, of conflict with squatters and developers, of extinction (Mowforth & Munt, 2008). Many of these opportunities and limits show themselves in many examples of developed and developing countries (Tosun, 2001; Butts & Sukhdeo-Singh, 2010; Kennett-Hensel et al, 2010; Mbaiwa, 2011; Vargas-Hernandez, 2012).
Sustainable Tourism can be one possible solution of these problems because it is developed and maintained in an area (community, environment) in such a manner and at such a scale that it remains viable over an indefinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and well-being of other activities and processes (Butler, 1993).

2.2 Sustainable Tourism in Tourist Destinations

Sustainable Tourism permits to develop an area through attraction and creation of economic, social and environmental resources, without compromising the abilities and resources of future generation. But the tourism sector, just like any other economic sector, faces competitive pressures which are rising substantially in today's globalized society (Kozak, 2004).

These pressures are felt especially in tourist destinations that had to be more attractive to visitors and more competitive of other tourist destinations. The term competitiveness of destination or the territory is a concept particularly complex (Tardivo et al., 2012) because it is formed of a varied range of factors, wherein the sustainability plays a prominent role. According to Godfrey and Clarke (2002) sustainability becomes synonymous with long-term competitiveness, while according to Ritchie and Crouch (2000) the sustainability is the bases of long-term success of the competitiveness of destination.
The concept of competitiveness is multidimensional and, in the tourism field, describes the tourist destinations (Enright & Newton, 2005; Hassan, 2000, Pearce, 1997) as an area in which the pair-sustainable competitiveness is particularly emphasized. The concepts of competitiveness and attractiveness of a destination are different, because they see the destination from different perspectives: the attractiveness from tourist point of view, while competitiveness from destination point of view (Vengesayi, 2003).
Important definitions of competitiveness of destination are provided by Dwyer, Forsyth and Rao (2000):

«*tourism competitiveness is a general concept that encompasses price differentials coupled with exchange rate movements, productivity levels of various components of the tourist industry and qualitative factors affecting the attractiveness or otherwise of a destination.*»

and by d'Hartserre (2000):

«*the ability of a destination to maintain its market position and share and/or to improve upon them through time.*»

The combination of competitiveness-sustainability is particularly emphasized in the context of tourist destinations and the theme of the competitiveness of a sustainable tourism destination has assumed, therefore, a major role in the international literature of recent decades (Franch et al., 2010; Hong, 2009; Enright & Newton, 2005; Ritchie & Crouch, 2003; Hassan, 2000).
Sustainable tourism development in tourist destination is realistic if all stakeholders can agree priorities: ecological maintenance, local community, and tourist satisfaction. For these reasons, often managers are looking to establish strategies and operational procedures that lead to the achievement of sustainable competitive advantage of tourist destinations, including also benchmarking techniques (Kozak & Rimmington, 1999).
Therefore, the main goal of regional governments and destination management institutions is to succeed in competitive struggle by increasing the competitiveness of their destination. The quality of strategic planning and final strategies is a key factor of competitiveness.

2.3 Importance of planning of Sustainable Tourism decisions

If tourism is to be considered a legitimate avenue for attracting resources, specific strategies will need to be put in place. If they are to be effective, these strategies require direction from the state in terms of appropriate policies, plans and a regulatory framework, and the support of private sector and community stakeholders. Harrison (2003) affirms that:

«*properly planned and managed, tourism can conserve natural resources and bring widespread benefits to local communities.*»

The main conditions for sustainable tourism is an efficient planning practice, a systematic implementation of the plans, a continuous and efficient management, in addition to increasing

involvement of stakeholders. Sustainable development of a tourist destination must be able to support and ensure the social, cultural and economic development of the affected communities, to protect the natural and cultural environment, to offer quality products to satisfy consumers, to ensure adequate management and monitoring.
An appropriate strategy for sustainable tourism should contribute to creation of jobs at the local level, to build structures that can facilitate investment, to facilitate cooperation between public and private sector , provide relief to those who intend to work in the tourism sector, to ensure understanding of the role played by tourism in the local and national economics and the local tourism cohesion on development initiatives (Ene & Bărăitaru, 2010).
To control and plan the effects and the consequences of tourism decisions, the tourism managers and territorial actors need information.
Through information and data which tourism managers get from used indicators (not simply measures of current conditions but also "early warning" devices to alert managers of imminent problems), they can: identify easily some important and urgent problems in order to undertake appropriate measures, identify influences and act before the serious damage is done, minding limits and opportunities, giving help to the managers for better evaluation and responsible decisions (Jurdana & Frleta, 2011).
Evaluation is critical to understand whether policies and programs are appropriate and efficient in achieving their intended objectives. Evaluation involves quantitative and qualitative data. Quantitative tools tend to be used most frequently (often simple arrivals or expenditure based measures), but the impact of tourism on communities and individuals cannot always be reduced to quantitative measures, hence the need also to use qualitative tools to understand how policy interventions may have shaped tourism outcomes (OECD, 2010).
The indicators of sustainability must be coupled with other tools and approaches to managing tourism in a sustainable way. Having in mind all the attributes of the tourist destination, indicators of sustainable tourism enable the identification, measurement and tracking of key changes and potential risks. (WTO, 1996)
The literature suggests identifying economic, environmental and social indicators (Butler 1991; Pigram 1990; Carbone, 2005; Weaver, 2006; Schevenes & Momsen, 2008; Jurdana & Frleta, 2011; Albu 2012) to control the sustainable tourism.
In particular, Waever (2006) affirms that an indicator set should incorporate variables that describe the condition, viability and potential influence of the tourism system (number of tourists, annual growth, unit of accommodations, labor force employed in tourism), the effects of the target system on the viability of other systems (water and air pollution, gas emissions produced by tourism activities) and the conditions of external systems (infant mortality rate, labor force unemployed, GDP per capita), hence different drivers regarding aspects of the environment, economy and society.
Even the WTO, since 1996, had suggested several measures of sustainable tourism, identifying eco-tourism/natural assets such as site protection, tourism contribution to local economy, development control, critical ecosystem; cleaner production as waste management; tourism carrying capacity as planning process, consumer satisfaction, local satisfaction, use intensity (WTO, 1996). Few indications were given on environmental management and supporting assets.
Tourism theory recognized the basic importance of environmental quality to ensure the future existence of most kinds of tourist destinations. Tourism managers have been willing to incorporate environmental measures into current management strategies and methods because they can generate lower costs (first aspect) and/or higher revenues and profits (second aspect).

The first aspect usually refers to energy (Iaea, 2005; Holmes & Mohanty, 2012), water and other resource (Gossling et al., 2011; Weaver, 2011) saving programs and thus, in many cases, it results in cost reductions; it is also economically attractive for environmental managers and easily supported by business and political forces located at the destination. The second aspect requires higher environmental awareness, more information and co-ordination, public management and substantial (public) financial resources; it is much more exacting and expensive to manage. It also requires a long-term view; it brings present costs and future benefits (Mihalič, 2000).
The focus of the literature has also focused on the preservation of cultural, environmental and landscape resources (Hawkins, 2004; Santonocito, 2009; Osmanković et al., 2010; Bagadion & Del Fierro-Juan, 2013) as a source of attraction of the tourist destination to be preserved and enhanced.
Thanks to diffusion of mobile life (Gambari, 2010), indicators of level and quality of infrastructure and supporting assets are most popular (Cernat & Gourdon, 2007).
Even if the high interest shown by the managerial literature (Viassone, 2012; Tardivo et al., 2012; Cernat & Gourdon, 2012; Vargas-Hernandez, 2012; Tosun, 2001) towards the assessment of tourism sustainability doesn't result in a universal accepted framework of indices capable of identifying a sustainable destination, the analysis of the doctrinal contributions leads to the identification of five dimensions of sustainable tourist destination: environmental management, ecotourism/natural assets, supporting assets, cleaner production.
Several of the indicators of sustainability and competitiveness identified in the economic literature are contained in the guidelines of the ecolabels or prizes of sustainability.
The criteria for obtaining of certifications or/and awards of sustainability can be successfully guidelines for local actors and managers in strategic planning for sustainable development of the tourist destination. Moreover, benchmarking with other tourist destinations would allow, with a systemic point of view, the creation of a virtuous cycle for the long-term development.
Even though the tourism sector is not the typical field where the benchmarking methods are widely used, such approaches could be successfully applied (Luštický & Kincl, 2012).

2.4 The role of prizes of sustainability to define the strategies for sustainable tourism destinations

To grow through tourism is necessary that strategic decisions are oriented to sustainable development. Policy makers need data and information that can be combined into a model can support the sustainable development of tourism destinations.
Moreover, the benchmarking with other tourist destinations, that won the prize for sustainability, would allow, with a systemic point of view, the creation of a virtuous cycle for the long-term development. In this way, governments, environmental groups, tourism organizations, tourists, focus their efforts on sustainability, proceeding to conceptualize, measure, and standardize sustainable tourism practices.
The sustainable certification has two important issues. First, that the principal positive benefits of sustainable tourism indices and measures are not the establishment of internationally recognized and technically rigorous measurement. Rather, development and implementation of sustainable tourism certification is a process that can result an important dialogue and policy-making process about the type of tourism development that a country wishes to pursue, greater awareness in the business community of the needs and contribution of the local communities, and a shift in attitudes across sectors and generations. The second issue is that the certifications brings to

awareness of the importance of country capacity. It is the ability of a government to develop and successfully implement effective policies of sustainable tourism.
The sustainable tourism certification process must provide governments and stakeholders with an opportunity to carefully consider such factors as the type of tourism that they want, the amount of local cultural and economic participation involved, and the products and activities to be encouraged. These local conditions and goals must be a major component of the sustainable index conceptualization, measurement and aggregation.
Therefore, local actors do not have to plan their strategies based only on the information of ecolabels and benchmarking, but they must adjust them according to the specific conditions and characteristics of the tourist destination.
The implementation of tourism certification of one way to encourage sustainable tourism and to harmonize the conceptualization of sustainable practice. Honey (2003) defines certifications as a set of procedures that audits and gives written assurance that a facility, product, process, service or management system meets specific standard or sustainability.
The guidelines of prizes of sustainability can be a good tool for tourist destination development but must be used cautiously in order not to turn it into a tool negative. As a sustainable development tool, the guidelines of ecolabels have their advantage, such as showcasing good practices and encouraging voluntary improvements; they also has its drawbacks, such as not being equitable and efficient (Sasidharan et al., 2002).

3. METHODOLOGY OF RESEARCH

The purpose of this paper consists of identifying the set of features of worldwide benchmark destinations of sustainable tourism (Luštický & Kincl, 2012) in order to create an illustrative framework to be followed by destinations which choose the path of sustainability.
We choose this methodology because it has resulted appropriate in other fields like for example that of social accountability (Viassone, 2010) and business social responsibility heritage tourism SMEs (Winkler & Günther, 2010). To achieve this task, the research involved 81 benchmark variegated European tourist destinations (towns, regions, beaches, etc) awarded with the most important prizes for sustainability (Environmentally Sustainable City Award, Blue Flags, Eden European Destination of Excellence, Tourism for Tomorrow's Awards, European Green Capital Award, European Prize for Tourism and Environment) in the last 5-years. This number is a representative sample for our exploratory research, which aims at mapping the benchmark models to follow. The heterogeneity of world destinations considered in our sample is useful to determine the main common characteristics that make them excellent (Tardivo et al., 2014). In particular our analysis involved 36 destinations awarded with Environmentally Sustainable City Award, 5 destinations awarded with the European Green Capital Award, 12 Blue Flags destinations, 20 Eden European Destinations of Excellence, a single destination awarded with the Tourism for Tomorrow's Awards and 8 destinations awarded with the European Prize for Tourism and Environment.
We chose to apply this analysis only to European benchmark destinations in order to reply to the need for compatibility of data and their accessibility; even if only applied to the European destinations this sample is representative for our exploratory research and allows us to draw up paths of sustainability for tourist destinations. The process followed in this study is structured in 3 main steps: first, we individuated the main drivers (macro-dimensions) of sustainable

destinations supported by literature and by practice; second, we individuated all the tourist destinations awarded with the most important prizes for sustainability; third, the qualitative research is based on a frequency analysis of the levels of different characteristics of the several macro-dimensions and sub-dimensions affecting destination sustainability, classified in five macro-areas: environmental management, eco-tourism/natural assets, supporting assets, cleaner production and tourism carrying capacity;,
The qualitative research based on this process supports the emerging of new variables necessary for improving our knowledge of the sustainability of tourist destinations. Table 1 shows sample characteristics (Tardivo et al., 2014).

Table 1. Sustainable destinations awarded in the last five years.

Environmentally Sustainable City Award	*"Blue Flags" destinations*
Provincia di Isernia, IT	Netherlands, NL
Regione Calabria, IT	Licko-senyska, HR
Växjö, SE	Réunion, FR
Provincia di Chieti, IT	Etelä-Savö Södra Savolax, FI
Provincia di Barcellona	Rethymno, GR
(Sabadell), ES	Regioni italiane (Toscana, Marche, Liguria,
Lund, SE	Campania, Puglia, Emilia Romagna, Lazio), IT
Puerto Lumbreras, ES	
Provincia di Alicante, ES	*Eden European Destination of Excellence*
Stockholm, SE	Città di Gmünd / Carinzia (AT)
Riga, LV	Marche-en-Famenne (BE)
Agueda, PT	Pustara Višnjica (HR)
Pilea-Hortiatis, GR	Kalopanayiotis (CY)
Regione Abruzzo, IT	Slovacko (CZ)
Regione Sardegna (Quartu	Lahemaa Manieri (EE)
Sant'Elena, Nuoro, Carloforte,	Roubaix (FR)
Sassari), IT	Comune di Delphi (GR)
Vignola, IT	Mecsek (HU)
Aachen, DE	The Great Western Greenway,
Provincia di Girona, ES	Co Mayo (IE)
Cipro, CY	Montevecchio, Comune di
Hannover, DE	Guspini (IT)
Provincia di Genova, IT	Ligatne Village (LV)
Provincia di Roma, IT	Rokiškis Manor (LT)
Regione Veneto, IT	Gharb (MT)
Goteborg, SE	Veenhuizen (NL)
Provincia di Torino, IT	Żyrardów (PL)
Plumaugat, FR	Parco Naturale di Faial (PT)
Montedinove, IT	Alba Iulia (RO)
Andalucia, ES	Idrija (SI)
Barreiro, PT	Trasmiera Ecopark (ES)
Bilbao, ES	
Vila Nova de Gaia, PT	
Loures, PT	*Tourism for Tomorrow's Awards*
Malta, MT	Alpine Pearls (SLO, A, IT, D, CH, FR)
Bruxcelles, BE	
Rennes Metropole, FR	
Regione di Stuttgart, DE	*European Prize for Tourism and Environment*
Provincia di Granada, ES	Zielgebiet Colbitz-Letzlinger Heide, DE
	Oscos Eo, ES
European Green Capital Award	Päijänne Lake District, FI
Amburgo, DE	Waterways britannica, UK
Vitoria-Gasteiz, ES	Corfù e Vido Island, GR
Nantes, FR	Veluwe Piano della Mobilità, NL
Copenhagen, DK	Azzorre, PT
Bristol, UK	Ponte de Lima, PT

Source: Tardivo et al. (2014).

4. KEY FINDINGS

Results of this analysis allow to map the characteristics of the tourist destinations on the base of the five macro-dimensions (environmental management, ecotourism/natural assets, supporting assets, cleaner production and tourism carrying capacity) and provide a picture of the benchmark sustainable tourist destination. Throughout the frequency analysis it has been possible to understand the value, the importance and the frequency of each dimension and sub-dimension in terms of its contribution to the sustainability of the tourist destination (Table 2 in Appendix).
Table 2 shows the percentages associated to the highest frequencies in a particular level of a certain sub-dimension in bold characters. Despite only in a few cases we get frequencies corresponding to 100%, in most cases the highest frequencies are above 50%, representing real distinctive features of sustainable destinations.

5. DISCUSSIONS

Even if the high interest shown by the managerial literature (Viassone, 2012; Tardivo et al., 2012; Cernat & Gourdon, 2012; Vargas-Hernandez, 2012; Tosun, 2001) towards the assessment of tourism sustainability doesn't result in a universal accepted framework of indices capable of identifying a sustainable destination, the results of this paper confirm the relevance of the five dimensions previously cited in its determination.
In addition, they emphasize how the various sub-dimensions provide a different contribution in the definition of a sustainable tourist destination.
In Table 3 we have summarized the two highest percentages shown for each macro-dimensions, that is the features present in most benchmark destinations:

Table 3. Features present in most benchmark destinations.

Macro-dimensions	Sub-dimensions with the highest percentage
Environmental management	Good quality of energy supply Good quality of energy efficiency
Ecotourism/natural assets	High nature conservation Increasing tourism development
Supporting assets	Telephones/mobile phones in line with other national/European areas Medium presence of internet
Cleaner production	On average waste generated Discrete hygiene and sanitation
Tourism carrying capacity	High Customer care Positive image

Source:Authors' elaboration.

With respect to "*environmental management*" the sub-dimensions that show the highest percentages are energy supply, that has registered a high level in 100% of cases, and good quality of energy efficiency (96%): in fact, there is a growing recognition that the global tourism industry requires vast amounts of energy for the production of its products, services, and visitor experiences (Kelly & Williams, 2007). Moreover, there exist several energy indices of

sustainable development both in literature and in practice (Iaea, 2005). Despite the importance of energy efficiency, according to Holmes and Mohanty (2012), out of 200 billion Euro spent globally on clean energy in 2011, less than 7% went to energy efficiency.
Buildings turn out to be efficient in 83% of destinations (Tardivo et al., 2014). As emphasized by Mensah (2007) with reference to hotels, most of the environmental management programs have been occasioned by the quest for sustainable tourism development.
Furthermore, in our research, as an instrument of consumer choice, ecolabels result a valuable environmental management tool in tourism (Honey, 2003; Sasidharan et al., 2002; Buckley, 2002): in the form of ISO 3166-2; UNI EN ISO 9001:2008; UNI CEI 11352, UNI-EN-ISO 14001, eea, ISO 50001, UNI EN ISO 9001. UNI EN ISO 27001. ECOLABEL and EMAS (university and hotel), tourism ecolabelling is present in every destination awarded (Tardivo et al., 2014). There are specific tasks that ecolabels are intended to perform in the service of sustainability (Watanatada, 2010): set common definitions and guidelines for social and environmental impact, engage stakeholders in decision-making and collaboration, communicate good performances to consumers, provide assurance to consumers and other stakeholders, increase sales because of the better performance of a product, change expectations of a product or service. Even if ecolabelling is too expensive and requires time (Synergy, 2000; Tardivo et al., 2014), this represents an effort of every destination to improve the environmental performance (Font, 2002). Literature also emphasizes some aspects reviewed recently, such as water consumption and climate change (Gossling et al., 2011; Weaver, 2011), which in our study show quite good performances.
With reference to the sub-dimensions of "*ecotourism*", in the last years the tendency in the tourism sector was that of return towards nature and towards the authentic cultural values. This resulted in a number of new forms and terms such as ecotourism and responsible tourism (Mowforth & Munt, 2008) which were often seen as more "environmentally conscious" products (Saarinen, 2014; Hughes, 2004).
Ecotourism, defined as "*ecologically sustainable tourism with a primary focus on experiencing natural areas that foster environmental and cultural understanding, appreciation and conservation"* (Ecotourism Australia, 2003), represents the most important form of manifestation of sustainable tourism and involving activities that directly contribute to the nature protection and to keeping the old human creations unaltered. Despite its importance, the concept is widely misunderstood and it is often used as a marketing tool in order to promote tourism businesses related to nature (Barna, 2009). Results collected by Tardivo et al. (2014) demonstrate how, with regard to this sub-dimension, for almost each one the highest percentage is above 50% apart for natural assets and protected areas: the first ones are mostly hilly and mountainous in 46% of cases, symptom of destinations capable of overcoming the limits that a mountain territory can determine in terms of transports and logistic connections and of making mountains their point of strength for winter season and related sport activities (ski, snowboard, etc.) (i.e. the Province of Turin), for trekking or simply for natural reserves and panoramic views (i.e. Ligatne or Alpine Pearls). In the same way, despite the high importance assigned by literature (Hawkins, 2004) to protected areas in the field of sustainable destinations, they are present in high percentages only in 46.5% of destinations. This is a very critical point because protected areas are considered by literature as the cornerstones of conservation strategies spearheaded by local, national, international actors; furthermore they become refuges and havens for species and ecological processes (Bagadion & Del Fierro-Juan, 2013).

The highest frequencies with reference to the ecotourism are registered with respect to high tourist conservation (99%): in fact, it is supported by Tsaur et al. (2006) how residents' participation and support of resource conservation could influence the destination sustainability (Tardivo et al., 2014). Despite about 3.8 billions Euro have been potentially made available for nature investments across all ERDF Operational Programs, the allocation of funding varies enormously between projects and between countries across Europe (Brandl et al., 2011). Still related to ecotourism, also the increase of tourism development turns out to be important (96%), thus showing an effort by these destinations to improve safety, promotion and to differentiate their offer. According to the UNWTO data (2014), international tourist arrivals in Europe grew by 5 % during the first half of 2013, with best results recorded in Central and Eastern Europe (+ 9 %) and Southern and Mediterranean Europe (+ 6 %). In particular, there is an agreement on the need to promote sustainable tourism development in order to minimize its environmental impact and to maximize socio-economic overall benefits at tourist destinations (Ahmed, 2013).
In her paper focused on Sicily, Santonocito (2009) emphasizes the need for an excellent tourist development, based on quality and uniqueness of its resources. In order to achieve this scope, she suggests to privilege models of tourism development that are increasingly in line with the requirements of a sustainable and durable growth.
As for cultural resources, in 89% of cases they are represented by artistic and cultural heritage, while only 2% of destinations show both natural and artistic heritage and 9% just natural heritage: this emphasizes how the most sustainable destinations are basically artistic sites. In particular Osmanković et al. (2010) underline how the tourists are becoming more interested in different elements of the culture and nature of the host country and how often the sun and sea offer of certain countries is complemented with additional cultural or natural resources of different types (Tardivo et al., 2014).
Another important peculiarity of the benchmark sustainable destinations is given by the fact that, in 83% of the awarded destinations, tourism represents a key point in their employment. In terms of employment, tourism development often provides the dual advantages of generating employment and income while promoting cultural heritage and traditions (World Travel Tourism Council, 2012). This shows how tourism, which is assuming a more and more important role in the economic literature (Franch et al., 2010; Hong, 2009), is strictly connected to the concept of territorial competitiveness (Tardivo et al., 2012) and how the latter has sustainability at the basis of its success in the long run. Furthermore, also the presence of beach assets seems to be a positive factor since present in 54% of the destinations of our sample while the situation of congestion in terms of traffic, even if with a frequency of 67%, is not so important to prevent them from being awarded for their sustainability (Tardivo et al., 2014).
In the same way, also the dimension "*supporting assets*", considered as a key to sustainable tourism development, is able to determine a precise profile of the benchmark sustainable destinations, showing percentages equal or higher than 50% for each sub-dimension. In literature infrastructure indicators generally refer to transport infrastructure, electricity production, sanitary, water access, accommodations, restaurants and other tourist facilities; a very important role is also played by ICT infrastructure captured by several classical indicators, such as number of phone lines, mobile phone penetration, and Internet hosts. Finally, also entertainment infrastructures are considered very important, although not necessarily for all types of tourism (Cernat & Gourdon, 2007). With reference to our framework, almost all destinations (97%) owns an intensive internet network while the totality owns telephones and mobile phones in line with other national/European areas: this results in a profile of sustainable destinations equipped with a

medium/high telephone and internet network. This means that these destinations reflect the current market trends that show how tools of mobile communication are becoming always more integrated in our daily life (Dabholkar et al., 1996) and often used together with other mobile devices (Collier & Bienstock, 2006; Tardivo et al., 2013). Despite these data, the use of the resources available on the Internet in a country depends on many factors. Thus, there are Countries such as Iceland, Norway and Sweden, showing the highest penetration rates of Internet (near to 90%), compared to the United States that presents rates of 77.3% (The Gallup Organisation-European Commission, 2012). In particular, Europe presents average rates of 61.3%, compared to 28.9% of the average rate for the rest of the world (Ficarelli et al., 2013).

Medium values (or on average with national/European data) are registered with regard to networks (roads, railways, airports) (82%), to sanitation access (good only in some areas in 61% of cases) and to the presence of restaurants (68%). Main weaknesses registered by the networks involve the lack of internal motorways (i.e. in the province of Isernia) or only discrete communication hubs (i.e. in Pilea-Hortiatis). It is important to emphasize the presence of a scarce level of sanitation access in 33% of destinations: main problems involve the difficult accessibility to these services because of the fragmentation of the territory, of the old age of the population and of cuts in public spending for this sector. An opposite situation is registered by the offer of restaurants that counts 32% of destinations with several restaurants, sign of a variable extremely important in the choice of a tourist destination as emphasized in literature (Viassone, 2012; Symons, 1999). Finally, entertainment, considered as crucial in the choice of a destination (Viassone, 2012; Krešić & Prebežac, 2011), is present in every sustainable destination (Tardivo et al., 2014).

"*Cleaner production*" defined as "the continuous improvement of industrial processes, products and services to reduce the use of natural resources, to prevent — at source — the pollution of air, water and land and to reduce waste generation — at source — in order to minimize risk to human population and the environment" (van Berkel, 1996), could be applied in the tourism industry, focusing on certain components of the environmental issues within an organization (i.e. minimizing the use of resources and improving eco-efficiency in terms of energy and raw material, preventing and reducing waste and emissions, etc. (Lee, 2001)). Li and YingPing (2007) demonstrate that it is an inevitable path for the sustainable development of the tourism industry and emphasize the important role played by tourist landscape eco-design. In particular, these two authors conduct a systemic analysis on the spatial structure of tourist landscapes and presents an ecology, culture, region and science (ECRS) model of tourist landscape eco-design.

Cleaner production shows different situations with regard to its various factors: while the level of pollution is optimal (50%) or on average (50%) in every destination, hygiene and sanitation are discrete in 60% of cases, with services of poor quality in some destinations like Andalusia and Stockholm. In the same way, the situation of the recycling waste is also critical, since it is low in 44% of destinations; this datum is even more serious if we consider that waste generated is on average in 83% of destinations and high in 16% of them. In fact, as societies grow more wealthy, they create a larger amount of waste: in 2012 cities generated about 1.3 billion tons of waste per year and this is expected to increase to 2.2 billion tons by 2025. For this motivation, its disposal becomes a major challenge (The World Bank, 2012).

Only sporadic cases are exceptions with reference to recycling waste and, in this framework, one among the highest percentages of recycling waste in Europe can be attributed to Stockholm.

With reference to "*tourism carrying capacity*", the situation is more positive because every sub-dimension shows the highest percentages at optimal or medium level. In fact, even if tourism

gives an important contribution to the tourist destination development, it can cause also negative impacts mainly on the environment and social context in case of uncontrolled development of the tourist activities and the intensive land exploitation, that can cause a rapid reduction of the environmental, cultural and social resources, with negative effects on the tourism development. For this motivation it has become a real challenge for both planners and managers (Maggi & Fredella, 2011). In fact, carrying-capacity thinking could be interpreted as an application of sustainable tourism (Butler, 2010) and this concept occupies a key position in understanding the limits of growth thinking in tourism (Tribe et al., 2000). In literature, talking about carrying capacity means to search for the "magical' number" of tourists in a certain space (and time period) which cannot be overstepped without causing serious negative impacts on the resources (Saarinen, 2014; Lindeberg et al., 1997). With regard to our sample the sub-dimension that shows the highest frequencies at high level is customer care, characterized by high levels in almost the totality of destinations (96%), with continuous and important investments in welcome services. Also image collects a frequency of 94% at the level "high" and it is prevalently associated to the cultural and natural heritage. Given that destination image influences tourists' travel decision making towards a destination and satisfaction levels of the experience, the perception of it is very important in the evaluation or selection process (O'Leary & Deegan, 2003; Casalegno & Viassone, 2012). In 2014 Porto has been elected the Best European Destination 2014 and won the title ahead of 19 big European cities. Zagreb, Vienna, Nicosia, Budapest, Madeira Islands, Milan, Madrid, Berlin and Rome are considered the next best destinations for a holiday or city-trip in 2014.

Sustainable destinations show also a high lodging occupancy in 88% of cases, thanks to the policy of hospitality and accommodation to tourists. A medium level is shown by other dimensions: in this case, the highest percentages are covered by: food quality, rated as "good" in 92% of destinations thanks to the typical territorial products; number of days of the visit, that in 92% of cases are 4 to 7, not resulting only in a excursionistic tourism; the number of tourists, "on average" in 84% of cases, while high only in a few destinations like the Province of Barcellona, Stockholm, four Italian Provinces, six Italian regions and one Italian site (Tardivo et al., 2014).

6. CONCLUSIONS AND IMPLICATIONS

Given that the topic of the competitiveness of a sustainable tourism destination has assumed an increasing importance in the last decades (Franch et al., 2010; Hong, 2009; Enright & Newton, 2005; Ritchie & Crouch, 2003; Hassan, 2000) we have integrated ideas from destination management, sustainability management, and tourism research, showing how the benchmark sustainable destinations share a very peculiar profile, showing how some elements are considered as basic for sustainable destination and, for this motivation, present at high level in all of them (energy supply and nature conservation): in fact, it is well known that the global tourism industry requires large amounts of energy in order to facilitate transportation of travellers, to provide amenities and supporting facilities at the destinations visited (Kelly & Williams, 2007; Mensah, 2007). The abundance of the investment potential in energy efficiency (estimated by DG Climate Action to be 4.25 trillions Euro across the economy between 2011 and 2050) and the supposed modest costs of its investments compared to power generation investments indicate that there exist important barriers to express the potential of energy efficiency and they should be pulled down (Lewis et al., 2013). Another very important aspect is high nature conservation; a definition

of environmental sustainability is provided by Morelli (2011) who describes it as an expansion of the common perception of the nature of human activity so as to more clearly connect it with the ecological concept of interdependence and to serve as a goal for environmental managers. As supported by Carlsen (1999), without an attractive environment no economic and social impact would occur. Nature conservation results an important driver to support a destination sustainability as maintained by Tardivo et al. (2014) and by Tsaur et al. (2006) Given the important amounts provided by EU for project concerning nature conservation, successful project application should show: the specific requirements of the respective program, strategic knowledge, bringing the right proposal at the right time, having the lead partner from the 'right' country and the quality of the project itself (Brandl et al., 2011). At the same time, also an increasing development in tourism is a constant in benchmark sustainable destinations, in particular when it is based on quality and uniqueness of its resources (Santonocito, 2009).
In addition, also supporting assets (in particular Telephones/mobile phones and presence of internet) are indispensable for the sustainability of an area and increasingly integrated in our daily life (Dabholkar et al., 1996). Furthermore, an extreme importance is assumed also by tourism carrying capacity that varies from place to place and represents both a driver and a limit of sustainable tourist destination (Tribe et al., 2000): with regard to this dimension, customer care and image are absolutely the most important sub-drivers to consider - the latter plays an important role on destination choice and it has become an essential part of a destination's strategic equity (Milman and Pizam, 1995).
For this reason, there is a strong need to develop research strategies in order to investigate how external images of a destination could influence the internal process of identity formation among the European tourists.
In the same way, other elements could be considered as not essential - even if very important - in reaching the denomination of sustainable destination because, even if their level is low, they do not prevent these destinations from representing a benchmark: these are a hilly and mountainous territory and low levels of recycling waste (Tardivo et al., 2014). In the same way, the very high frequency shown by an only discrete hygiene sanitation could be considered.
The contribution of this paper both for literature and tourism management is important: in fact, it enriches literature providing a framework of the common characteristics shown by benchmark sustainable destinations; furthermore, it helps policymaking in drawing long-term planning strategies. Furthermore, the proposed methodological framework would allow for the creation of a comprehensive database against which the sustainability of tourist destinations in various countries can be assessed (Tardivo et al., 2014).
This paper allows also to draw important strategies of action for destinations interested to begin a path of sustainability or to improve it:
First, it is very important to offer to these tourists, often interested in the culture and image of these destinations, a high level of quality at all stages of their travel, as well as investing in information services to make known the potentialities and itineraries suitable for the specific needs of these categories (Groth, 2000).
Second, it is essential to develop campaigns of sensitization towards environment protection: this is possible throughout a communication of the advantages that a good recycling waste program could bring and by incentivizing the development of programs capable of leading to the UNESCO candidature. In order to diffuse a sustainable culture it is more and more important to involve all stakeholders: a sustainable approach requires widespread and committed participation in decision making and practical implementation by all those implicated in the outcome (Institute

for Tourism Research in Northern Europe, 2011). Furthermore also a suitable communication program of the model of sustainable tourism is required. The future diffusion of the culture of sustainability not only in the entrepreneurial field but also in tourism will strongly change the management of destinations.
Despite the academic and practical relevance of the paper, it also displays important limits: first, it provides the same framework for every kind of destination (see, mountain, cultural, religious ones etc.) while in the future it would be useful to create a specific set of characteristics of excellence for each type of destination; furthermore, this research doesn't analyze the contribution of each dimension to the global level of sustainability throughout a quantitative analysis but limits itself to a frequency analysis. Moreover our study only considers the sustainable destinations awarded in the last 5 years and belonged to the European area and not the totality of them; finally, as unique parameter of benchmark of sustainability it employs the award assigned to different tourist destinations, neglecting other parameters that may affect the competitive destination (Tardivo et al., 2014).
Further researches should be directed towards finding and defining possible benchmark models for particular type of destination (bathing, mountainous, religious, etc.); moreover, it is possible to further develop this research by analyzing, on a wider scale, characteristics of benchmark destinations in order to predict the guidelines to be followed by destination managers and tourism firms and the new destination concept emerging from the adoption of a sustainability-oriented culture (Tardivo et al., 2014).

ACKNOWLEDGEMENTS

Although this paper is based on a combined effort, Prof. Giuseppe Tardivo is to take credit for Introduction and Conclusion and Implications; Angela Scilla is to take credit for paragraphs, 2.1, 2.2, 2.3 and 2.4; while Milena Viassone for paragraphs 3, 4 and 5.

We thank Roberta Pinto for her help in the collection of the data.

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APPENDIX

Table 2. Frequency value of each sub-dimension of sustainability emerging from the analysis.

		High	*On average or Problems only in a few areas*	*Low*	
Environmental Management	Water shortage	18%	21%	**61%**	
	Crime indices	12%	**46%**	42%	
		Efficient/good quality	*Discrete quality*	*Problematic*	
	Energy efficiency	**96%**	4%	0%	
	Buildings	**83%**	12%	5%	
	Energy supply	**100%**	0%	0%	
		Very rich resource	*Not present but very closed to it*	*Absent*	
	See water	**45%**	24%	31%	
		Mild	*Not bad, not mild*	*Hot summer and cold winter*	
	Climate	**59%**	6%	35%	
		EDEN European destination of excellence	*Winner of the European Green Capital Award*	*Winner of Tourism for tomorrow's awards*	*Covenant of Mayors and/or blue flags*
	Environmental agreement	11%	19%	11%	**59%**
		Present	*Absent*		
	Tourism ecolabelling	100%	0%		
		Mostly flat	*Mostly hilly and flat or with coast*	*Mostly hilly and mountainous*	
Ecotourism/ natural assets	Natural assets	15%	39%	**46%**	
		Present	*Absent but close to the destination*	*Absent*	
	Beach assets	**54%**	10%	36%	
		Key point in the employment of the destination	*Seasonal*	*Scarce*	
	Employment in tourism	**83%**	17%	0%	
		Artistic and cultural heritage	*Both natural and artistic heritage*	*Natural heritage*	
	Cultural resources	**89%**	2%	9%	
		Congestion	*Some cases of congestion*	*Sustainable traffic*	

	Traffic	**67%**	12%	21%
		High	*Industrial touristic offer*	*Low*
	Nature conservation	**99%**	1%	0%
		High percentage	*Medium percentage*	*Absent*
	Protected areas	**46,5%**	**46,5%**	7%
		Increasing	*Seasonal*	*Scarce*
	Tourism development	**96%**	4%	0%
		Excellent	*Good*	*Scarce*
Supporting assets	Networks	8%	**82%**	10%
		Good everywhere	*Good only in some areas*	*Scarce*
	Sanitation access	6%	**61%**	33%
		Intensive	*Medium*	*Scarce*
	Internet	**97%**	2%	1%
		Numerous	*In line with other national/European areas*	*Scarce*
	Telephones/mobile phones	0%	**100%**	0%
	Restaurants	32%	**68%**	0%
	Lodging	**52%**	42%	6%
		Historical/cultural tours	*Natural tours*	*Other*
	Entertainment	**50%**	**50%**	0%
		Optimal	*On average*	*High*
Cleaner production	Level of pollution	**50%**	17%	33%
		High	*On average*	*Low*
	Percentage of recycling waste	19,5%	36,5%	**44%**
	Waste generated	16%	**83%**	1%
		Efficient	*Discrete*	*Scarce*
	Hygiene and sanitation	7%	**65%**	28%
		High	*On average*	*Low*
Tourism carrying capacity	N. of tourist	16%	**84%**	0%
	Customer care	**96%**	4%	0%
		High	*Good*	*Low*
	Food quality	8%	**92%**	0%
		Excellent	*Good*	*To be improved*
	Level of service	18%	**70%**	12%
		Good (via Web)	*Good (via newspapers, journals…)*	*Scarce*

	Tourist information	**49,5%**	**49,5%**	1%
		Attention to sustainability	*Standard*	*Scarce*
	Furnishing or furniture	27%	**72%**	1%
		Yes	*More or less*	*No*
	Homogeneity of tourism flows	**50%**	**50%**	0%
		High/increasing	*On average*	*Cuts/decreasing*
	Public expenditure in tourism management	37%	**41%**	22%
		High (More than 50€)	*Discrete (30-50€)*	*Low (Up to 30€)*
	Expenditure par day	6%	**48%**	46%
		Higher than a week	*4-7*	*Up to 3*
	N. of day of the visit	3%	**92%**	5%
		High	*Discrete*	*Low*
	Lodging occupancy	**88%**	12%	0%
		High (More than 100€)	*Discrete (60-100€)*	*Low (Up to 60€)*
	Hotel prices	11%	**72%**	17%
		High	*Discrete*	*Low*
	Safety	**70%**	27%	3%
		Positive	*Quite positive*	*Negative*
	Image	**94%**	6%	0%

Source: Tardivo et al. (2014).